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Proliferation:
Threat and Response

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PREFACE

THE NEW THREAT FROM NUCLEAR, BIOLOGICAL, AND CHEMICAL WEAPONS

During the height of the Cold War, the Russian physicist Andre Sakharov said, "Reducing the risk of annihilating humanity in a nuclear war carries an absolute priority over all other considerations." The end of the Cold War has reduced the threat of global nuclear war, but today a new threat is rising from the global spread of nuclear, biological, and chemical weapons. Hostile groups and nations have tried — or have been able — to obtain these weapons, the technology, and homegrown ability to make them or ballistic missiles that can deliver the massive annihilation, poison, and death of these weapons hundreds of miles away. For rogue nations, these weapons are a ticket to power, stature, and confidence in regional war.

We received a wake-up call with Saddam Hussein's use of SCUD missiles during Operation Desert Storm and new information on his ambitious nuclear, biological, and chemical weapons programs. The proliferation of these horrific weapons presents a grave and urgent risk to the United States and our citizens, allies, and troops abroad. Reducing this risk is an absolute priority of the United States.

The way we reduce the risk from weapons of mass destruction has changed dramatically. During the Cold War, the United States and the Soviet Union lived under a doctrine known as Mutually Assured Destruction, commonly known as "MAD." MAD was essentially a balance of terror that assumed neither nuclear power would launch an attack and risk nuclear retaliation. This nuclear stand-off has ended. Instead, the United States and Russia are working together to reduce and dismantle our nuclear arsenals, and to prevent the export and sale of those weapons and related technology throughout the world.

Our progress is good news. The bad news is that in this era the simple threat of retaliation that worked during the Cold War may not be enough to deter

terrorists or aggressive regimes from using nuclear, biological, and chemical weapons. Terrorists operate in a shadowy world in which they can detonate a device and disappear, as the poison gas attack in Tokyo illustrates. Rogue regimes may try to use these devastating weapons as blackmail, or as a relatively inexpensive way to sidestep the U.S. military's overwhelming conventional military superiority. Aggressors may also actually use these weapons in an attempt to gain a decisive edge in a regional war. The bottom line is, unlike during the Cold War, those who possess nuclear, biological, and chemical weapons may actually come to use them. The increase in the likelihood of regional war in today's world raises the risk.

This new danger requires some new thinking and new leadership on how to prevent, deter and, if necessary, respond to this threat. Through the Nunn-Lugar program, we have hastened dismantlement of Russia's nuclear weapon systems; denuclearized Ukraine, Kazakhstan, and Belarus; strengthened the safety and security of nuclear weapons and fissile material; and removed 600 kilograms of highly enriched uranium from Kazakhstan in the dramatic Project Sapphire. America's diplomatic leadership helped bring the nations of the world to extend — indefinitely — the Nuclear Non-Proliferation Treaty, which will serve to stem regional or even new global arms races. In one region in particular — the Korean peninsula — American diplomatic leadership helped bring North Korea to sign the Agreed Framework, which in effect froze its nuclear program. These successes demonstrate that U.S. diplomatic leadership in the world is critical to nonproliferation of nuclear, biological, and chemical weapons.

At the same time, America's defense leadership bolsters the diplomatic nonproliferation effort by helping to protect the United States and our citizens, allies, and military forces abroad from aggressors who may possess or obtain nuclear, biological, and chemical weapons. The Department of Defense (DoD) provides this leadership through a three-part strategy:

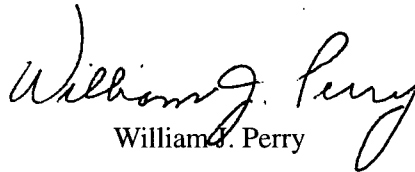
PREFACE

1. Reduce the threat, by leading the U.S. effort to help the former Soviet Union republics reduce, dismantle, safeguard, and even eliminate these weapons.
2. Deter against the threat, by maintaining strong conventional forces and a smaller but robust nuclear deterrent force.
3. Defend against the threat through the Defense Counterproliferation Initiative.

The DoD Counterproliferation Initiative involves a range of Department-wide activities that help to prevent, protect against, and even reverse the

danger from spreading nuclear, biological, and chemical weapons; technology; and missiles that can deliver them. These efforts include developing systems that can intercept or destroy these weapons, providing vaccines and protective suits for our troops, keeping track of the movement of weapons and technology, and providing unique DoD support for various nonproliferation agreements.

This document details the proliferation phenomenon, the threat it poses to the United States, and the programs and policies DoD employs through the Defense Counterproliferation Initiative to counter this growing threat.



William J. Perry

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Section I

The Regional Proliferation Challenge

THE REGIONAL PROLIFERATION CHALLENGE

The quest for nuclear, biological, and chemical (NBC) weapons and the missiles to deliver them creates serious challenges to U.S. interests around the world. Many states have agreed voluntarily to terminate their weapon development programs, but others have not. This section discusses the threat from proliferation to regional stability, U.S. defense strategies, and other interests of the United States and its allies.

The United States faces several regional proliferation challenges. North Korea's decades-long threat to the security of Northeast Asia, and in particular to South Korea and Japan, has become more serious as the Democratic People's Republic of Korea has in recent years significantly advanced its nuclear, chemical, and ballistic missile programs. The United States is leading international efforts, through implementation of the October 1994 Agreed Framework, to bring North Korea into compliance with its nonproliferation obligations including the Nuclear Non-Proliferation Treaty (NPT), International Atomic Energy Agency (IAEA) safeguards, and the North-South denuclearization accord. In the Middle East/North Africa region, the United States remains concerned about the threat that Iran, Iraq, and Libya pose to the stability of the region and to the security of U.S. interests, allies, and friends. The United States continues efforts to prevent Iran and Libya from advancing and Iraq from reconstituting their weapon programs. In both regions, the Middle East/North Africa and Northeast Asia, where states are seeking to incorporate these weapons of mass destruction into their militaries, the Department of Defense is working to ensure that the United States retains the ability to defend its interests and to maintain the credibility of U.S. defense commitments to our allies and friends.

In the former Soviet Union, the vast amount of nuclear technology and material in the region presents an attractive target for determined proliferators, including terrorist and criminal groups. Maintaining control over the accountability of these capabilities and materials presents a daunting challenge to the United States, the new governments of the region, and the rest of the international community. Several bilateral and multilateral agreements with Russia and the other states of the former Soviet Union, such as those supported by the Defense Department's Cooperative Threat Reduction program, have significantly reduced the proliferation threat from that region.

In South Asia, the United States has important security interests in enhancing stability in the region and preventing another Indo-Pakistani war. The nuclear and ballistic missile programs of India and Pakistan threaten the stability of the region and could result in grave loss of life. The United States seeks first to cap and then reduce and, eventually, eliminate regional capabilities to produce NBC weapons and the missiles that deliver them.

In some areas, nonproliferation efforts have already greatly enhanced regional security. For example, the proliferation threat in sub-Saharan Africa has largely receded as South Africa has dismantled its nuclear weapons program, joined the NPT, and accepted full-scope safeguards on its nuclear facilities. Similarly, Argentina, Brazil, and Chile have accepted full-scope safeguards on their nuclear facilities and brought into force the Treaty of Tlatelolco, and Argentina and Chile have joined the NPT. In addition, the Treaty of Tlatelolco is approaching full implementation with the anticipated ratification by Cuba. All these steps have reduced the danger of nuclear rivalry in the Western Hemisphere.

NORTHEAST ASIA



Nations of Northeast Asia

GOALS AND INTERESTS

Northeast Asia remains a region of vital importance to the United States, particularly in view of the growing prominence of the Pacific Rim nations as trading partners and as important players in the global economy. Security and stability in this region are essential if our economic relations are to continue to flourish. Our overarching long-term objective in the region remains the peaceful

reunification of the Korean peninsula. The United States will continue to maintain forces on the peninsula to assure security for South Korea as long as the Republic of Korea Government wants them to stay.

Although the October 1994 Agreed Framework with North Korea over its nuclear facilities mitigated the immediate nuclear threat, Pyongyang still possesses an unnecessarily large conventional force, as well as militarily significant chemical

weapons and the means to deliver them. Proliferation, particularly the broad-based NBC weapons and missile programs that North Korea has implemented, poses a significant challenge to U.S. security interests as well as to those of our allies and friends.

In the event of another war on the Korean peninsula, these weapons present a significant threat to our forces and the security of our allies. Should a conflict occur, North Korea likely will try to consolidate and control strategic areas of South Korea by striking quickly and attempting to destroy allied defenses before the United States can provide adequate reinforcements. Pyongyang hopes to do this with its large conventional force and its chemical weapons and ballistic missiles complement.

Strong bilateral relations with our allies and friends are the foundation of our Asia-Pacific strategy, and the North Korean NBC weapons and missile programs have the potential to complicate relationships within our bilateral alliances throughout the region. Should a proliferant go unchecked, calling U.S. capabilities and commitments into question, states may seek unilateral alternatives to ensure their security, thus stimulating proliferation. Nearly 100,000 soldiers, sailors, marines, and airmen of the U.S. Pacific Command maintain the strong forward presence that deters aggression, reassures our allies, and enhances stability throughout the region — a critical mission.

China, which has been a nuclear weapons state since 1964, remains a source of concern primarily because of the role of Chinese companies in supplying a wide range of materials, equipment, and technologies that could contribute to NBC weapons and missile programs in countries of proliferation concern. Beijing has signaled some willingness to adopt a more responsible supply policy by adhering to international nonproliferation norms such as the Nuclear Non-Proliferation Treaty (1992) and reaffirming to the United States its pledge to abide by the basic tenets of the Missile Technology Control Regime (MTCR). However, Chinese firms' continued willingness to engage in nuclear and missile cooperation with countries of serious proliferation concern, such as Pakistan and

Iran, presents security concerns in many regions where the United States has defense commitments. Counterproliferation will continue to be a strong component of our regional strategy in Northeast Asia as long as our defense commitments and our forces are threatened by the spread of NBC weapons and missiles.

THE PROLIFERATION CHALLENGE: REGIONAL CAPABILITIES, INTENTIONS, AND TRENDS

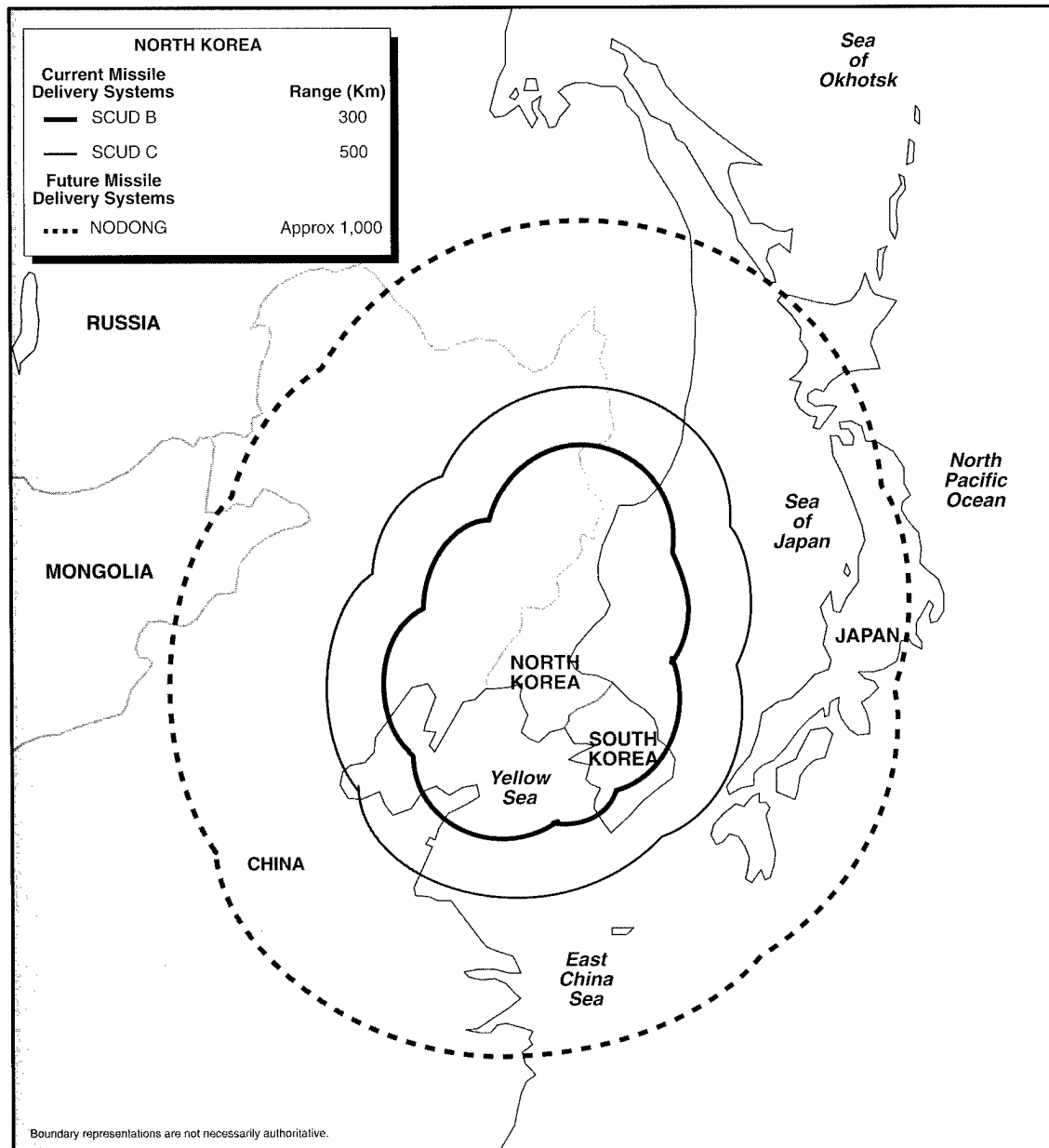
North Korea

As stated previously, the urgent threat of North Korean nuclear proliferation has abated since Pyongyang signed the Agreed Framework with the United States in October 1994. If Pyongyang adheres to this agreement, its current nuclear program will phase out over time. In the near term, its production of fissile material for nuclear weapons has halted under IAEA monitoring. Nonetheless, North Korea continues developing missiles and chemical warfare capabilities and exporting ballistic missiles and related technologies, which contribute to proliferation.

North Korea has significantly advanced its nuclear, chemical, and ballistic missile programs during the last 10 years. While agreeing to freeze activity at and eventually eliminate its existing plutonium production nuclear reactors and associated facilities, North Korea maintains chemical warfare and ballistic missile capabilities.

For many decades Pyongyang has mounted an all-out effort to build and strengthen its military. As a result, it has one of the five largest armed forces in the world — over one million active duty personnel. Over the years, Pyongyang has worked to improve its capability to launch a surprise attack against South Korea. With the right conditions, or with the perception of the right conditions, Pyongyang could launch an attack supported by chemical weapons and SCUD missiles against any military or civilian targets in South Korea, including key logistics facilities at Pusan, Taegu, and Kwangju.

REGIONAL BALLISTIC MISSILE THREAT

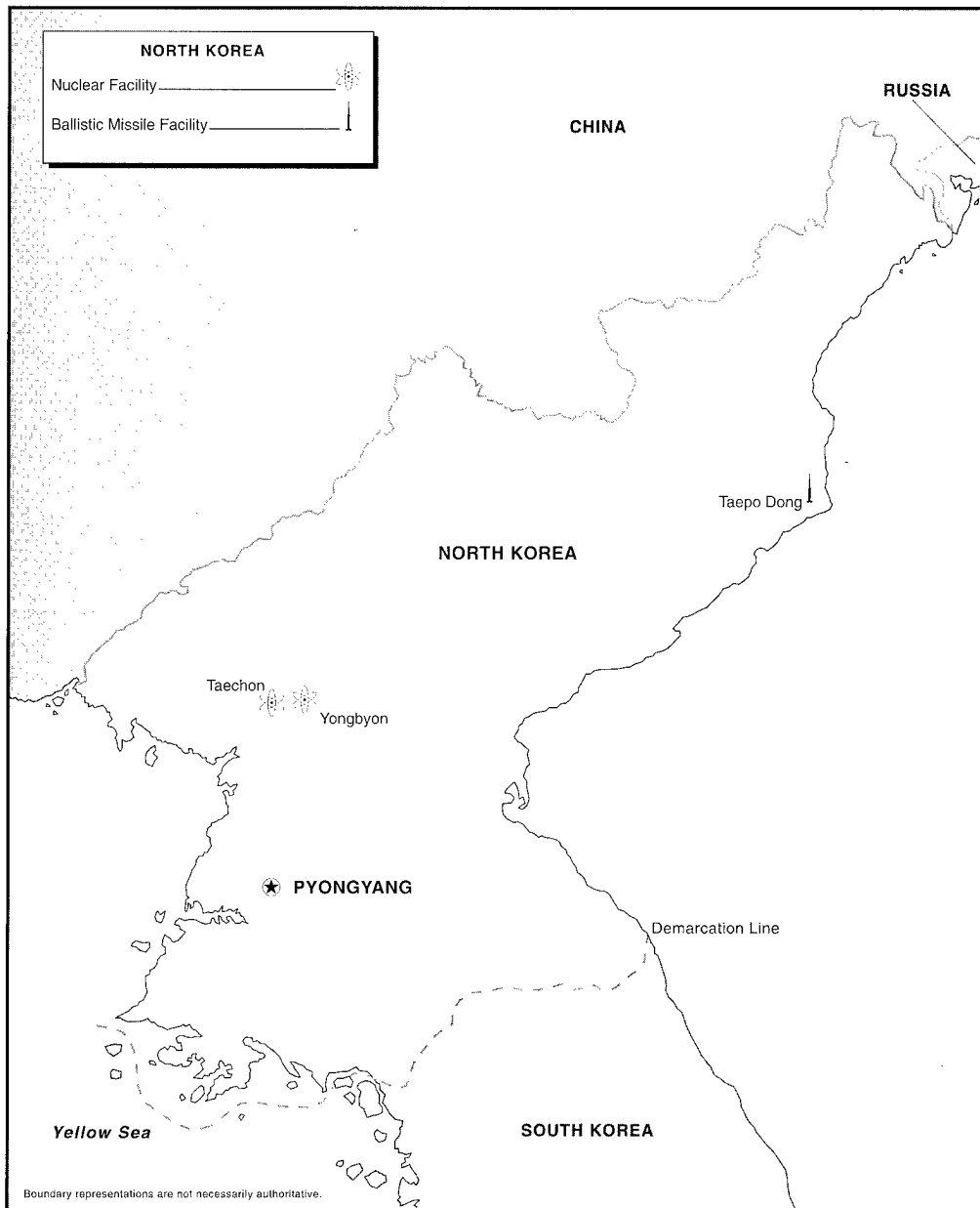


North Korea's current inventory of ballistic missiles allows it to strike targets throughout the peninsula. When the longer range missile — the NODONG — becomes operational, nearly all of Japan will be in range.

Despite its isolation, North Korea uses several methods to acquire technology related to nuclear, biological, or chemical warfare and missiles. For example, the Japan-based General Association of Korean Residents — the Chosen Soren — has among other activities an ongoing effort to acquire

and export advanced technology to North Korea. In addition, North Korean intelligence organizations are involved in clandestine operations to acquire technology, equipment, and scientific and technical information to aid the full spectrum of North Korea's conventional and NBC weapons programs.

SELECTED NUCLEAR AND MISSILE FACILITIES



While the nuclear complexes at Taechon and Yongbyon play a key role in North Korea's nuclear program, it is the 200 megawatt facility at Yongbyon that would have enabled North Korea to develop additional nuclear weapons. Taepo Dong is North Korea's main missile testing and launch facility.

NUCLEAR PROGRAM

In the 1960s, under a "peaceful uses of atomic energy" agreement, the Soviet Union provided North Korea a small nuclear research reactor and related training. This assistance vested North Korea with a fundamental understanding of and practical experience in nuclear physics and engineering as well as reactor operations.

During the 1980s and early 1990s, North Korea developed a complete nuclear fuel cycle that included a plutonium production capability at the Yongbyon Nuclear Research Center. This center, about 90 kilometers north of Pyongyang, comprises facilities with capabilities to fabricate nuclear fuel, a 5-megawatt (electric) reactor to produce plutonium,

and a reprocessing facility to extract weapons-grade plutonium from irradiated fuel — the key materials needed to produce nuclear weapons. This plutonium production reactor became operational in 1986, with some refueling in 1989, thereby providing weapons-grade plutonium for at least one nuclear weapon. Fuel from this reactor also was discharged in May-June 1994 and, had it been reprocessed, could have provided enough plutonium for several additional nuclear weapons.

Additionally, North Korea was building a 50-megawatt (electric) reactor at Yongbyon and a 200-megawatt (electric) power reactor at Taechon. Construction of these reactors has been halted under IAEA monitoring as part of the Agreed Framework, under which all of these facilities are obliged to be dismantled. The 50-megawatt (electric) reactor would have produced enough plutonium for North Korea to build an additional 7-10 nuclear weapons per year. Moreover, the reprocessing facility at Yongbyon has been sealed. This large facility was key because it would have enabled Pyongyang to extract weapons-grade plutonium from irradiated fuel from both the 5- and 50-megawatt (electric) reactors.

North Korea has not allowed the IAEA to perform inspections sufficiently comprehensive at all sites to verify the operating history of the 5-megawatt (electric) reactor, the amount of reprocessing accomplished, and whether special nuclear materials have been diverted to develop nuclear weapons. Under strict adherence to the Agreed Framework, however, North Korea must make its nuclear program completely transparent and must allow the IAEA to perform special inspections prior to the delivery of Nuclear Suppliers' Group (NSG) controlled items to the Light Water Reactors. North Korea also has obligated itself beyond its NPT and IAEA requirements by agreeing to eliminate eventually all its existing or planned nuclear power and related facilities.

CHEMICAL PROGRAM

North Korea began to develop a chemical industry and a chemical agent production capability after the Korean War. It had made significant progress by the late 1960s, when it began to produce offensive chemical agents experimentally.

Since the late 1980s, North Korea has intensified and expanded its chemical warfare program as part of its military preparedness plan. Today, it can produce large quantities of nerve, blister, and blood chemical warfare agents, and it maintains a number of facilities involved in producing or storing chemical precursors, agents, and weapons. A precursor is a commercial chemical that is necessary for the production of a lethal chemical agent.

Since 1990, Pyongyang has placed a high priority on military and civilian chemical defense readiness. It has mandated training in chemical environments as an integral part of armed forces training and is attempting to equip all military forces, including reserves, with full protective gear. In addition, broad segments of the population engage periodically in simulated chemical warfare drills. These drills ensure coordination and control of the population should the North employ tactical chemical weapons against opposing forces on its own territory. The drills also reinforce Pyongyang's propaganda that the United States and South Korea intend to employ chemical agents. Pyongyang has emphasized building and installing protection equipment at military production and civilian alternate wartime relocation sites, and it directed that the entire population be issued protective masks.

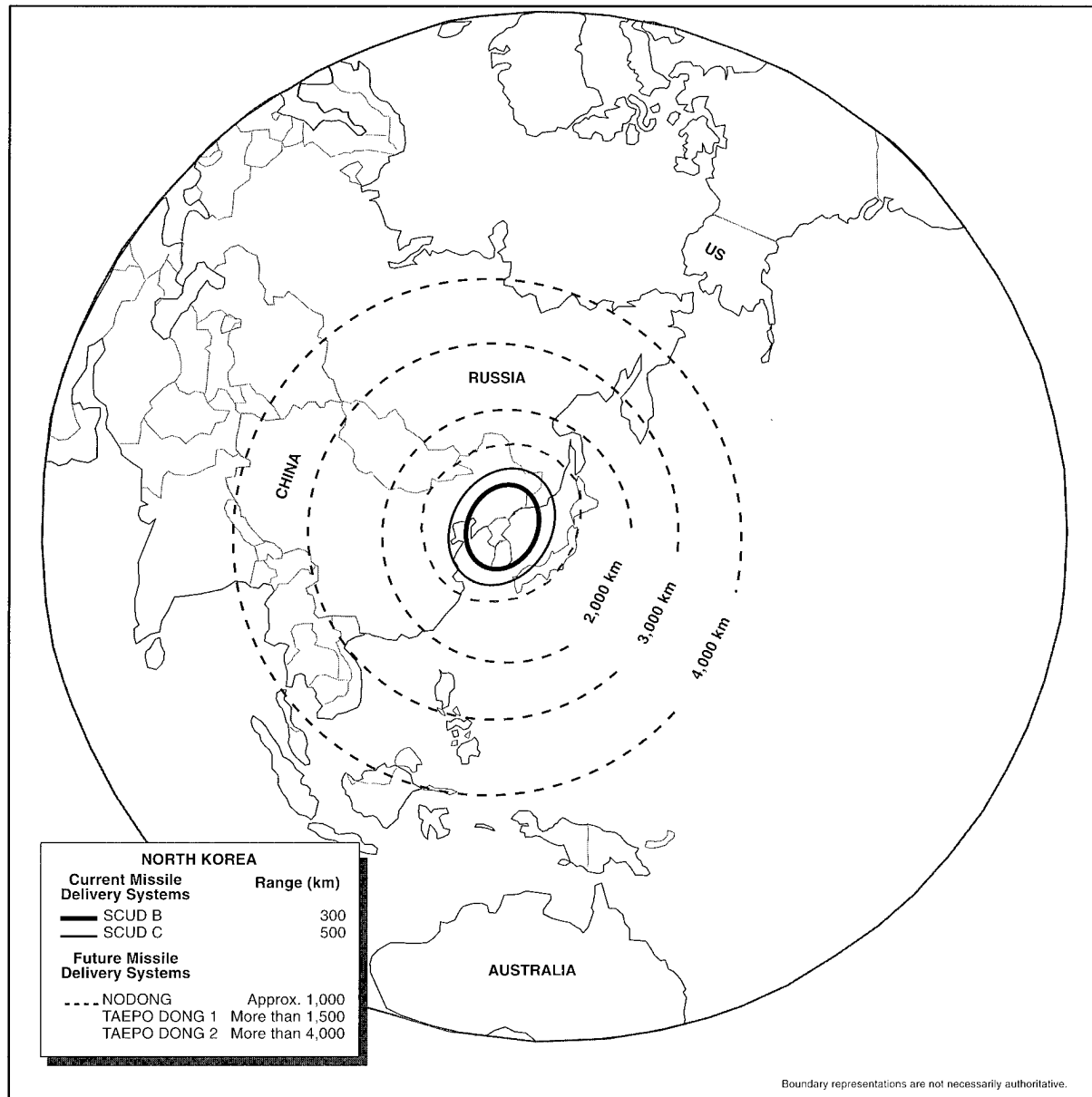
BIOLOGICAL PROGRAM

At the direction of President Kim Il-Song, North Korea began to emphasize an offensive biological warfare program during the early 1960s. With the scientists and facilities for producing biological products and micro-organisms, North Korea probably has the ability to produce limited quantities of traditional infectious biological warfare agents or toxins and biological weapons.

BALLISTIC MISSILES

North Korea has progressed from producing SCUD missiles to establishing a broad based missile industry, developing and producing a variety of missiles both for its own use and for export. Serious ballistic missile development began in the early 1980s, when Pyongyang started to reverse-engineer SCUD-B missiles. North Korea now produces the SCUD-B, with a maximum range of 300 kilometers, and a variant, the SCUD-C, with a maximum

RANGES OF CURRENT AND FUTURE BALLISTIC MISSILE SYSTEMS



range of 500 kilometers. Several hundred of these missiles are available for use in the North Korean missile force.

North Korea is in the late stages of developing a new missile, the NODONG, for its own military as well

as for export markets such as the Middle East and North Africa. Flight tested in May 1993, this 1,000 kilometer-range missile will be able to strike nearly all of Japan when it is deployed.

The North Koreans are looking well beyond the NODONG. Currently, they are designing two new missile systems — the TAEPO DONG 1 and TAEPO DONG 2 — which have estimated ranges greater than 1,500 and 4,000 kilometers, respectively. Though neither missile has been flight tested, the designs of both are likely based on new combinations of existing missile system components.

CRUISE MISSILES AND OTHER MEANS OF DELIVERY

North Korea has four types of land- and ship-based anti-ship cruise missiles. Since the 1980s, North Korea has produced two variants with ranges of about 100 kilometers based on Soviet and Chinese technology. It is developing a longer-range anti-ship cruise missile, flight-tested in 1994.

North Korea has a wide variety of combat aircraft capable of delivering NBC weapons, including MiG-29, MiG-23, MiG-21, Su-25, and Su-7 fighters; Il-28 bombers; and Mi-2, Mi-4, and Mi-8 helicopters. The North could use its indigenously produced artillery, multiple rocket launchers, mortars, and agricultural sprayers to disperse chemical agents. North Korea has a very limited air-to-surface missile capability.

ROLE AS SUPPLIER

North Korea has provided hundreds of SCUD missiles to countries in the Middle East, such as Iran and Syria, and is developing and marketing the new 1,000 kilometer-range NODONG missile. These sales provide Pyongyang with critically needed foreign exchange. North Korea has received millions of dollars worth of bartered goods and services and hard currency for its deliveries, and it will continue to market missiles and missile-related technology to support its weak economy. Although North Korea is an active supplier of missiles and related production technology, it has not yet become a supplier of nuclear, chemical, or biological warfare-related technology.

China

Since mid-1991, China has shifted from avoidance to participation in international arms control

regimes. In 1992, it acceded to the NPT and agreed bilaterally with the United States to abide by the guidelines and parameters of the MTCR. In 1993, Beijing signed the Chemical Weapons Convention (CWC). And, in October 1994, Beijing reaffirmed its commitment to abide by the 1987 version of the MTCR Guidelines and committed not to export ballistic missiles inherently capable of reaching a range of 300 km with a payload of 500 kg in exchange for the United States agreeing to lift the MTCR Category II sanctions it imposed in August 1993 for China's transferring M-11 related equipment to Pakistan. In addition, China has expressed support for negotiating a multilateral convention banning the production of fissile material for nuclear weapons and endorsed the 1994 U.S.-North Korean Agreed Framework. While China continues to conduct underground nuclear tests, it has stated that it intends to sign the Comprehensive Test Ban Treaty in 1996.

Nonetheless, some Chinese commercial transactions, particularly transactions involving nuclear-, missile-, and chemical-related technologies to unstable regions such as the Middle East and South Asia, raise serious proliferation concerns. The Chinese continue to modernize their inventory of nuclear weapons systems, which now includes over a hundred warheads deployed operationally in medium range ballistic missiles (MRBMs), intermediate range ballistic missiles (IRBMs), and intercontinental ballistic missiles (ICBMs). Since becoming a nuclear weapons state in 1964, Chinese officials have declared a policy of "no first use" repeatedly, and have stated that China's nuclear arsenal is for self-defense only.

China has a mature chemical warfare capability and may well have maintained the biological warfare program it had prior to acceding to the Biological Weapons Convention in 1984. It has funded a chemical warfare program since the 1950s and has produced and weaponized a wide variety of agents. Its biological warfare program included manufacturing infectious micro-organisms and toxins. China has a wide range of delivery means available, including ballistic and cruise missiles and aircraft, and is continuing to develop systems with upgraded capabilities.

China plans to expand its already substantial nuclear power program by constructing several new plants during the next 20 years. China continues to

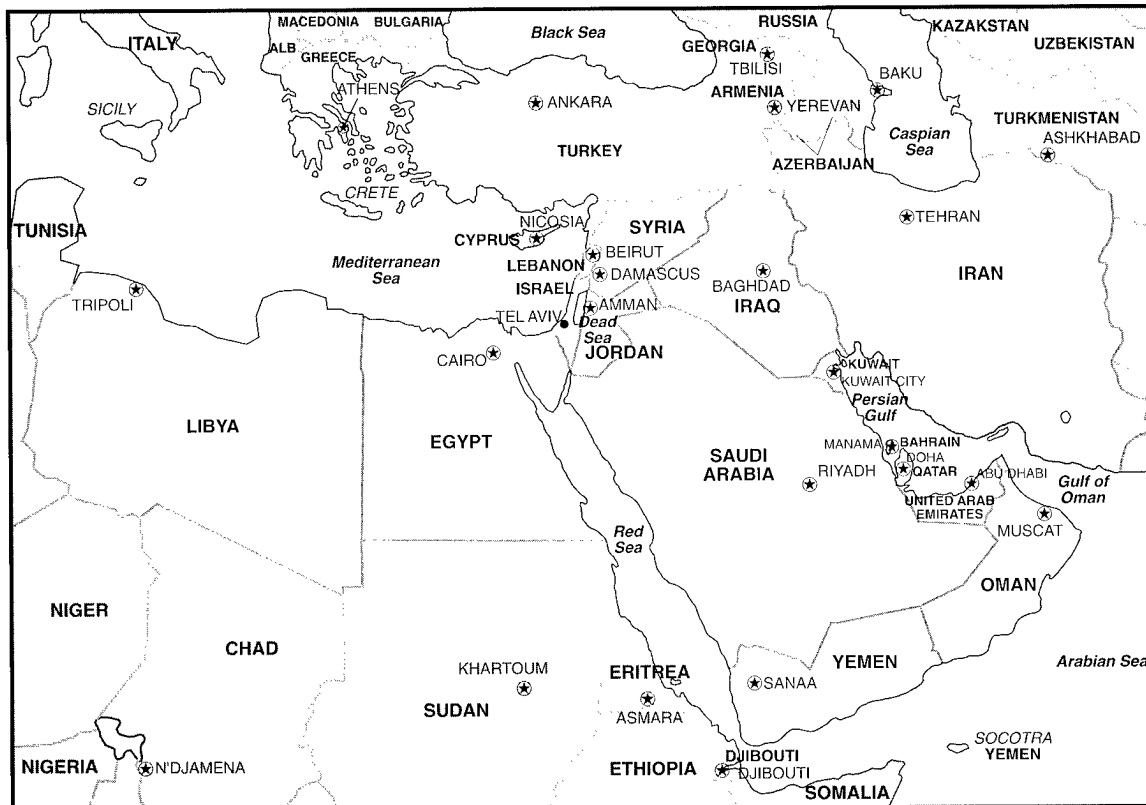
market its growing expertise in nuclear power technology to other countries, which adds to concerns about proliferating nuclear materials and know-how that may support weapons programs.

ROLE AS SUPPLIER

Because its conventional arms exports have declined significantly since the late 1980s, China's

defense industry is reluctant to reduce its remaining arms exports. In the past, China has exported chemical warfare-related material and missile technology and components to Iran. Overall, China continues to try to balance its role as an aspiring global power that abides by international arms control regimes with its need to use exports to expand its influence abroad and sustain its defense industries.

THE MIDDLE EAST AND NORTH AFRICA



Nations of the Middle East and North Africa

GOALS AND INTERESTS

U.S. goals in the Middle East and North Africa include securing a just, lasting, and comprehensive peace between Israel and all Arab parties with which it is not yet at peace; maintaining our steadfast commitment to Israel's security and well-being; building and maintaining security arrangements that assure the stability of the Gulf region and unimpeded commercial access to its petroleum reserves, which are vital to our economic prosperity; ensuring fair access for American business to commercial opportunities in the region; combating terrorism; and promoting more open political and economic systems and respect for human rights and the rule of law. In this volatile region, the proliferation of NBC weapons and the means to deliver them poses a significant challenge to our ability to achieve these goals. Iran, Iraq, and

Libya are aggressively seeking NBC weapons and missile capabilities, constituting the most pressing threats to regional stability. Iran and Iraq have demonstrated their intent to dominate the Persian Gulf and to control access to critical oil supplies.

Iran is actively attempting to acquire a full range of NBC weapons and missiles. The United States believes Iran is committed to acquiring nuclear weapons, either through indigenous development or by covertly acquiring enough fissile material to produce them. During its eight-year war with Iraq, Tehran initiated biological and chemical warfare programs, the latter in direct response to Iraq's use of chemical weapons. In addition, Iran is dedicated to expanding its ballistic missile programs.

Iraq has long had NBC warfare and missile efforts. The challenges these weapons pose in time of conflict became clear during the Persian Gulf War

when U.S. and allied forces had to deal with real and potential complications posed by Iraq's arsenal of NBC weapons and missiles. Iraq entered the Gulf War with a known chemical warfare capability and a demonstrated willingness to use it (Iraq used chemical weapons against Iranian troops and its own Kurdish population during the 1980s); a known biological warfare capability; and a developing, complex nuclear weapons program (despite intense nonproliferation and export control efforts by the United States and the international community (for example, the IAEA)). During the Gulf War, Iraq attempted to weaken the cohesion and resolve of the U.S.-led coalition by using its ballistic missiles as weapons of terror against Saudi Arabia and Israel; however, Iraq did not use its SCUDs with chemical or biological warheads.

In their quests to establish regional hegemony, Iran and Iraq probably regard NBC weapons and missiles as necessary to guarantee their territorial integrity and national security. Possession of nuclear weapons would likely lead to increased intimidation of their Gulf neighbors, as well as increased willingness to confront the United States. The U.S. defense commitment, military presence, and demonstrated ability to defend U.S. and allied interests against such threats are vital to achieving our goals in the region.

Libya remains a significant proliferation concern. Libyan leader Muammar Qadhafi has shown that he is willing and capable of using chemical weapons and missiles against his enemies. Libya sees the United States as its primary external threat, owing especially to U.S. support for UN sanctions against Tripoli for its refusal to turn over suspects in the terrorist bombing of Pan Am 103. Although Libya's capabilities to use chemical agents and missiles are limited, Qadhafi could provide these weapons to states he supports and that support him in return.

THE PROLIFERATION CHALLENGE: REGIONAL CAPABILITIES, INTENTIONS, AND TRENDS

Iran poses the greatest threat to the stability of the region and to U.S. interests; this will remain the case as long as UN Security Commission on Iraq is able to maintain its intrusive inspection regime in

neighboring Iraq. In the past, Iran has demonstrated both the will and the ability to use NBC to advance and defend national goals. Tehran used chemical weapons and ballistic missiles with conventional warheads during the Iran-Iraq war and has fired conventionally-armed cruise missiles at U.S.-flagged oil tankers.

In August 1995, Iraq admitted to a far more extensive NBC weapons and missile program than had been previously revealed. The Iraqis divulged to UN inspectors that prior to the Gulf War they had produced large quantities of biological warfare agents, had loaded them into missiles and bombs, had begun a crash program to build a nuclear weapon, and had produced engines for SCUD missiles.

In the future, the quality, scope, and staying power of the UN inspectors and on-site monitoring and verification processes will be central in determining whether the Iraqi weapon programs are dismantled, kept in check, or eventually succeed. However, Iraq's military production capabilities (not affected by UN sanctions and monitoring), past use of chemicals and missiles, and consistent efforts to deceive UN inspectors are strong indicators that Iraq will attempt to produce NBC weapons and missiles when outside constraints are absent.

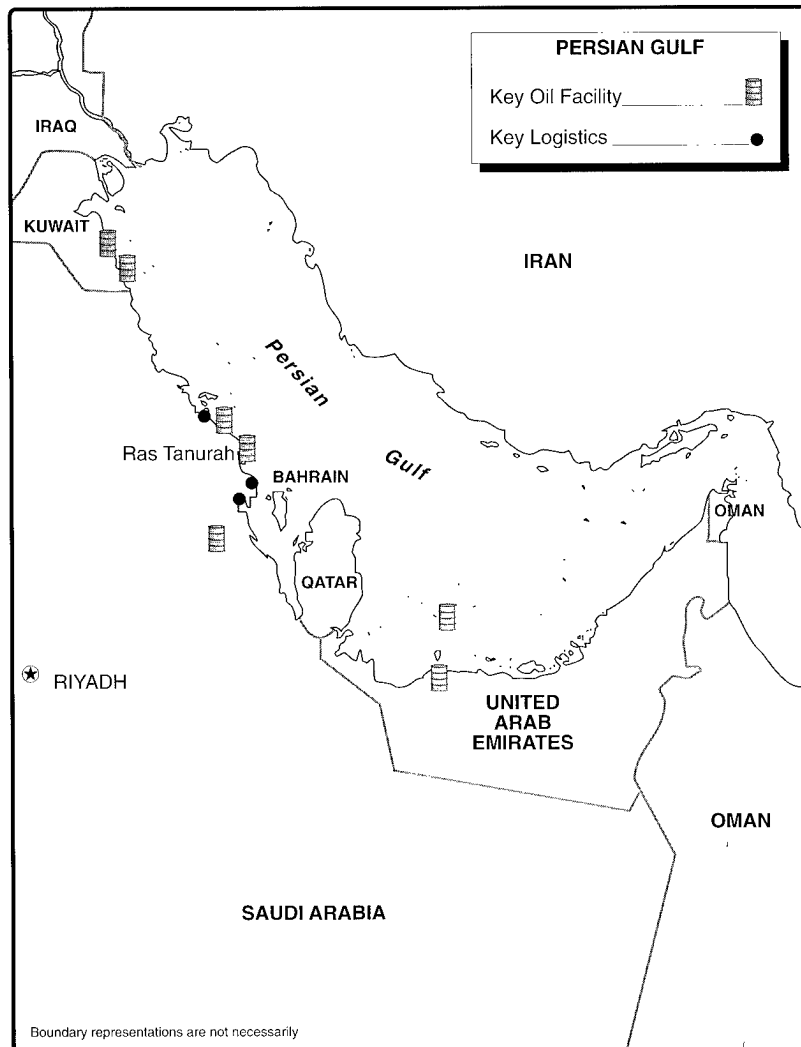
In October 1994, the Iraqis repeated their oft-demonstrated willingness to threaten military action to attain their goals when they deployed Republican Guard forces to southern Iraq, thereby threatening Kuwait and its oil fields. With reconstructed conventional forces and NBC weapons and missile capabilities, Iraq could again threaten states in the region, oil fields and facilities, U.S. forces, and key logistics facilities.

Iran

NATIONAL OBJECTIVES

Iran's primary national objectives are threefold: ensuring the survival of its Islamic government, limiting foreign influence in the Middle East, and spreading Islamic fundamentalism abroad. Tehran seeks to strengthen its political, economic, and military positions as a regional power and to reduce the influence of the West, especially the United States, in the Persian Gulf, and in the greater Middle East. In addition, Iran champions Muslim causes worldwide,

THE PERSIAN GULF: A REGION VITAL TO WORLD ECONOMIC STABILITY



About 40 percent of world oil imports come from the Persian Gulf.

supporting Islamic activism in other areas in the Middle East, Africa, and Asia. Iran's efforts to add to its military power and acquire NBC weapons and missiles support these national objectives.

Since becoming president in 1989, Hashemi Rafsanjani has sought to win international political acceptance for Iran in order to gain European and Japanese financial assistance to rebuild Iran's economy and military forces. Although some of Iran's public rhetoric has moderated, Iran's covert actions indicate its leadership is pursuing a policy of sponsoring terrorism and assassinations of exiled Iranian dissidents, opposing Middle East peace

efforts, and working to acquire and improve its NBC weapons and means of delivery.

Iran has placed a high priority on possessing NBC weapons and missiles since Tehran's defeat in the Iran-Iraq war in 1988. Iran has an adequate technological base to support chemical agent and missile production activities and a biotechnical structure capable of supporting the production of biological agents. Nevertheless, Iran is attempting to expand its current technological base to achieve self-sufficient production in all phases of NBC weapons and delivery systems. In the nuclear weapons arena, Iran is attempting to acquire an

indigenous capability to produce weapons-grade fissile material. Financial constraints, supplier reluctance, and limited indigenous capabilities in certain NBC programs have slowed Iran's progress in achieving these goals.

RESOURCES

Iran continues to suffer the negative economic effects of revolution, war, and mismanagement. Foreign debt has reached about \$30 billion, and Iran can afford only about \$1 billion annually for military-related imports. These financial constraints affect the pace of Iran's programs for NBC weapons and missiles, even though these programs continue to have high priority.

Iran makes many of its efforts to purchase NBC weapons and missile-related technologies on the open market, and there are indications that Iranian officials stationed abroad provide clandestine support, obtaining information on foreign companies and on employees susceptible to recruitment and looking for ways to avoid relevant laws and customs procedures. In addition, Iran employs some students studying abroad to acquire technical information and identify scientific researchers who might cooperate with Iran.

STRATEGY

Expanding its NBC programs, improving means of delivery, and improving conventional military capabilities all strongly support Iranian national objectives. Iran has emphasized the acquisition of power projection capabilities — ballistic missiles, combat aircraft, and submarines — to oppose intervention by foreign forces during some future conflict. In order to attain self-sufficiency for its military industry, Iran purchases complete weapons and components for assembly to facilitate the flow of technology necessary for indigenous production.

NUCLEAR PROGRAM

Iran's nuclear energy program began under the Shah and included power plant development and a small research reactor purchased from the United

States. The Shah also sponsored research aimed at producing fissile material for weapons development. In 1979, the country's Islamic revolution essentially halted the nuclear program, both weapons-related work and civilian nuclear activities (such as the construction of foreign-supplied power reactors). Since the end of the war with Iraq, the Islamic government has initiated civilian and weapons-related nuclear efforts, despite having signed the NPT. Of greatest concern, however, are Iran's efforts to acquire fissile material and key nuclear technology to support nuclear weapons development.

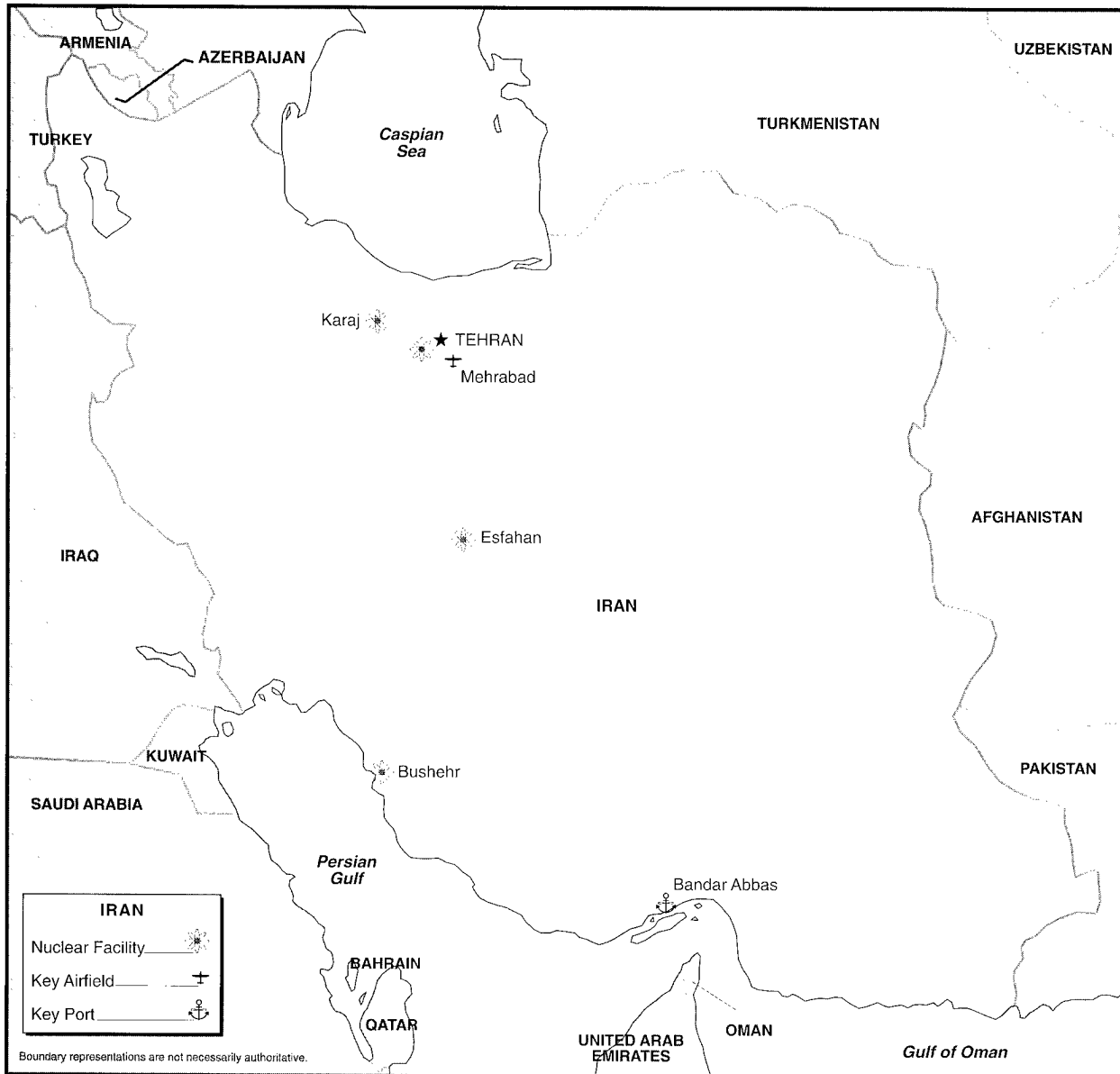
Iran has sought heavy water research reactors even though such technology has no use or value in its light water reactor-based civil nuclear power program. Iran's interest in uranium enrichment and spent fuel reprocessing, activities with no economic justification in Iran's civil nuclear energy plans, indicates Iran's desire for the capability to produce fissile materials for nuclear weapons.

China is a principal supplier of nuclear technology to Iran, and Russia may soon become another key supplier. The Iranians have purchased an electromagnetic isotope separation unit from China. (This was one of the enrichment technologies pursued by Iraq.) China has also sold Iran a research reactor that could be used as a training model for a plutonium-producing reactor. Iran's procurement activities provide strong evidence of this.

The Iranians state that nuclear energy is required to meet their present and future energy demands. They argue for using their own oil and natural gas reserves to generate hard currency revenues, rather than wasting them on domestic consumption. At the same time, Iran's nuclear power program could be used to legitimize its attempts to acquire capabilities in sensitive phases of the nuclear fuel cycle — such as uranium enrichment or spent fuel reprocessing — related directly to nuclear weapons development.

At this stage, Iran's scientific and technical base remains insufficient to support major nuclear programs. The Iranians recognize their dependence on foreign assistance and are encouraging younger Iranians to study abroad to gain needed technical expertise.

SELECTED NUCLEAR FACILITIES AND POINTS OF TRANSSHIPMENT



Major ports and airfields serve as key transshipment points for the delivery of NBC and missile related material.

CHEMICAL PROGRAM

Iran's offensive chemical warfare program began in 1983 in response to Iraq's use of mustard gas against Iranian troops. By 1987, Iran was able to deliver limited quantities of blister (mustard) and blood (cyanide) agents against Iraqi troops using artillery shells.

Iran has been producing chemical agents at a steadily increasing rate since 1984, and has cumu-

latively produced at a minimum several hundred tons of blister, blood, and choking agents. Tehran has weaponized some of these chemical agents — a weapons stockpile to support ground combat operations. In addition, Iran could attempt to deliver chemical bombs against targets such as airfields, ports, or oil installations across the Persian Gulf.

Iran has increased defensive and offensive chemical warfare training for its ground forces in the last two

years. Furthermore, it is making efforts to buy defensive chemical equipment from foreign sources, perhaps a prelude to acquiring indigenous production capability.

Although Iran has signed the CWC, its efforts to establish an independent chemical production capability and a wider program to put chemicals into battlefield weapons cast doubt on its adherence to the agreement.

BIOLOGICAL PROGRAM

Iran began its biological warfare program in the early 1980s during the Iran-Iraq war. It made agreements with numerous countries for cooperative research, scientific exchanges, and technology sharing. The Iranians are conducting research on toxins and organisms with biological warfare applications.

With their biotechnical support structure, the Iranians are capable of producing many different biological warfare agents. Iran has evolved from piecemeal acquisition of bioprocessing equipment and is now pursuing complete biological production plants that could be converted to producing biological warfare agents. Some of its major universities and research organizations may be linked to its biological warfare program.

BALLISTIC MISSILES

Iran first acquired SCUD-B ballistic missiles from Libya and North Korea and used them during the Iran-Iraq war. Later it received SCUD-B and SCUD-C missiles from North Korea, and CSS-8 missiles and other material from China. Iran fired nearly 100 SCUD-B missiles at Iraq from 1985 to 1988. As was the case with chemical weapons, Iran's motivation to improve and expand its ballistic missile force results from the war with Iraq, during which Iran could not respond adequately to Iraqi missile attacks on Iranian cities.

IRAN'S BALLISTIC MISSILES

Missile Type	Estimated Range (Kilometers)	Source
SCUD-B	300	Libya and North Korea
SCUD-C	500	North Korea
CSS-8 (converted SA-2)	150	China

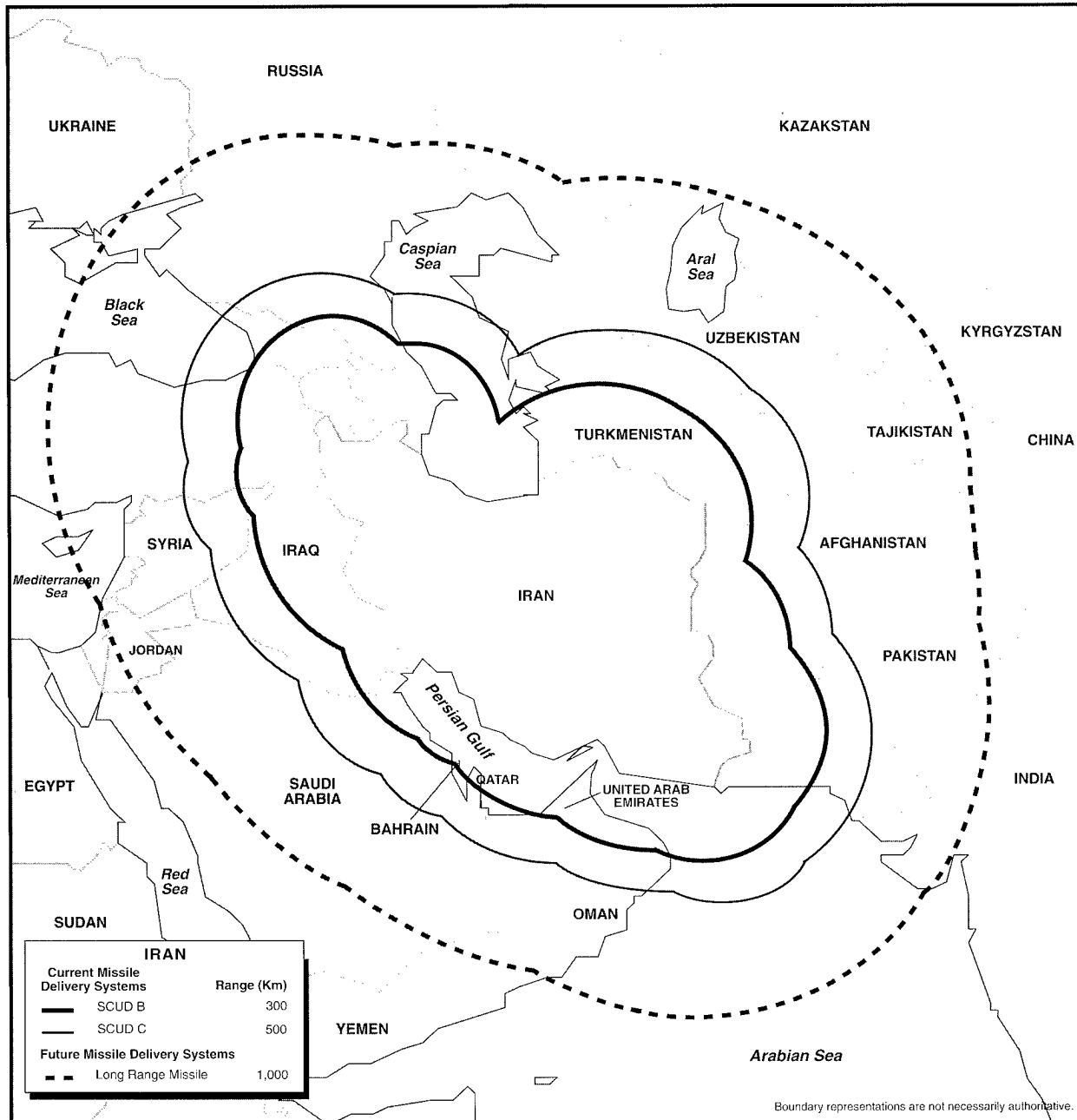
Iran has a two-track ballistic missile program. In addition to acquiring SCUD missiles and missile-related equipment from North Korea, it also seeks to establish its own missile production capability. Its production program is planned for both liquid-fueled and solid-propellant missiles. As part of the process, Iran has already begun assembling missiles using foreign-made components and eventually it may produce these components domestically. Further, it is actively attempting to acquire other assistance and missile-related technology from a variety of foreign sources for its goal of producing an MRBM.

With its current inventory of missiles, Iran can strike targets in neighboring countries, including oil installations and ports in Saudi Arabia. With a longer range missile, such as the North Korean NODONG, it would be able to strike targets in Israel and in most of Saudi Arabia and Turkey.

CRUISE MISSILES AND OTHER MEANS OF DELIVERY

Iran has Chinese land-based and shipborne anti-ship cruise missiles and Russian air-to-surface missiles, and has experience in employing some of them in combat conditions. During the Iran-Iraq war, for example, Iran fired at least 10 coastal-based Chinese missiles at Kuwait, one hitting a U.S.-flagged oil tanker. Iran will continue to rely on China as its supplier of cruise missiles. In addition, Iran has artillery and aircraft that can deliver chemical and biological agents and Russian-made Su-24 fighter-bombers that could deliver nuclear weapons.

RANGES OF CURRENT AND FUTURE BALLISTIC MISSILES SYSTEMS



North Korea is key to Iran's future missile program. Should Iran receive a longer range missile, such as the NODONG, it will be able to threaten a much wider area.

Iraq

NATIONAL OBJECTIVES

Despite Iraq's defeat in the Gulf War and the severe costs to its military forces and its civilian

infrastructure, Saddam Hussein's goals remain almost identical to those in effect prior to the war: to establish Iraq as the leading Arab political and military power in the Middle East and to dominate the Persian Gulf. To these ends, Saddam, or any successor with similar ambitions, will seek to

rebuild Iraq's conventional military forces and reconstruct its NBC warfare and ballistic missile capability.

Historically, Iraq had developed NBC weapons and missiles programs to support Saddam's two primary goals mentioned above. Saddam has demonstrated his willingness to use chemical weapons and ballistic missiles for their tactical, strategic, and psychological value. Iraq orchestrated the development of these weapons by diverting dual-use technologies and creating extensive procurement networks with front companies. Since the end of Operation Desert Storm, the United Nations has challenged Baghdad's lack of cooperation and its noncompliance with UN Security Council Resolutions (UNSCR). Iraqi government officials have used concealment, deceit, and intimidation with the aim of eventually rebuilding their missile force and their nuclear, biological, and chemical weapons programs.

RESOURCES

Iraq's economy remains weak because of United Nations' sanctions. These sanctions, based on a number of UNSCRs, prohibit arms imports as well as most industrial imports that support the civilian sector. Iraq also is not permitted to export oil or other goods unless the proceeds are spent on food and medicine (under UN supervision), and its assets abroad remain frozen. Although industrial production has increased since the end of the war, it is only about one-third of its pre-war level. In November 1993, Iraq accepted UNSCR 715 calling for continued UN monitoring of Iraqi weapons programs; unfortunately, all indicators suggest that this acceptance does not signal Iraqi intentions to forego eventually rebuilding its NBC weapon capabilities.

STRATEGY

Prior to Operation Desert Storm, Iraq systematically misled foreign suppliers and governments regarding the actual end-users of purchases. Further, Iraq purchased controlling interests in selected Western companies to obtain legal mechanisms for placing orders for products subject to export controls. It employed middlemen and established front companies to facilitate covert acquisition activities to funnel dual-use technol-

ogies to Iraq. In addition, the Iraqi government sent numerous students to Western universities to study nuclear technology so that these individuals could eventually support Iraq's nuclear program.

Iraq has continued its deceptive efforts to keep alive elements of its NBC weapons and missile programs, as demonstrated by the August 1995 public disclosures concerning the extent of Baghdad's biological warfare effort. Another example of Iraq's noncompliance is a December 1993 incident involving the interdiction of a shipment of ammonium perchlorate — a dual-use chemical with solid missile fuel applications. The shipment was a violation of UNSCR 715, which Iraq had already accepted.

The return of production equipment, computers, and documentation removed from key facilities prior to and during Operation Desert Storm has expedited reconstruction of military industries. Furthermore, Iraq is preserving enough of its NBC weapons programs to provide the foundation for revitalized efforts once sanctions are lifted and inspections ease or are terminated.

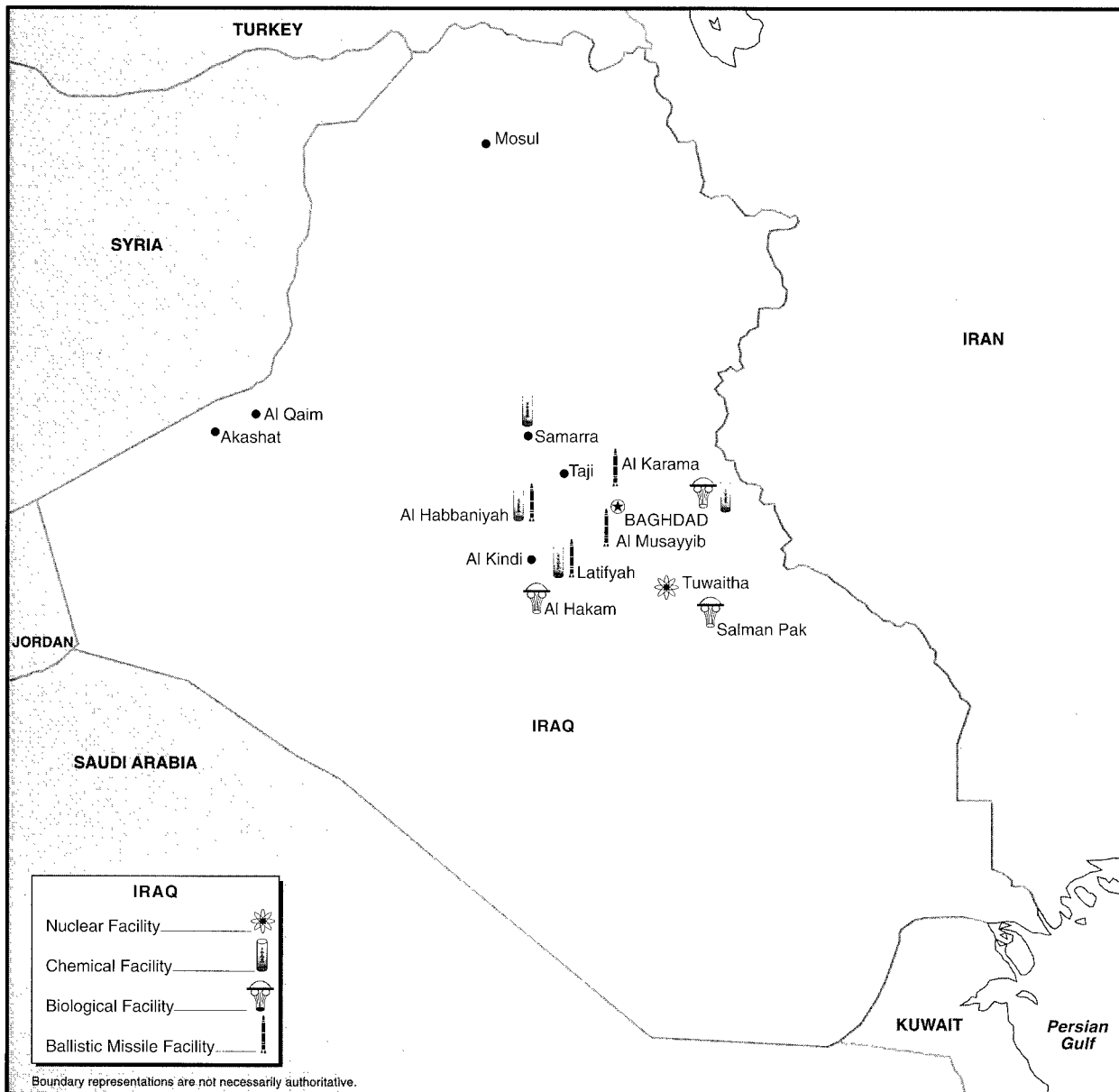
Iraq's large number of scientists and technicians is one of its most valuable resources for rejuvenating its programs for NBC weapons and missiles. Iraq retains the services of several thousand scientists, engineers, and technicians who were previously employed in its nuclear weapons program. With this pool of expertise, together with significant foreign assistance and supplies, Iraq could probably rebuild its nuclear weapons program and manufacture a device in about five to seven years.

NUCLEAR PROGRAM

Iraq's efforts to acquire a nuclear weapon production capability constitute a textbook case of the many avenues a country can pursue to reach this objective. To realize its nuclear weapon ambitions, Iraq established a broad, multifaceted program to produce fissile material and to develop the associated technology essential for nuclear weapon design.

Iraq began laying the groundwork for its nuclear weapons program in the 1970s, when it attempted unsuccessfully to purchase a plutonium production reactor similar to the one France used in its nuclear weapons program. In 1976, France agreed to build

SELECTED NUCLEAR, CHEMICAL, BIOLOGICAL, AND MISSILE FACILITIES



Despite severe war damage and over four years of UN inspections, Iraq retains some infrastructure to resurrect many of its NBC weapons and missile programs.

the Osirak and Isis reactors, part of Iraq's large nuclear research complex at Tuwaitha in Baghdad. From the late 1970s to the early 1980s, Baghdad experienced several setbacks, the most notable being the Israeli air strike on the Osirak reactor in June 1981 shortly before its first fuel was to be loaded. With the loss of this reactor, Baghdad apparently refocused its nuclear weapons effort on producing highly enriched uranium. Its interest in

acquiring plutonium as fissile material for weapons continued, but at a lower priority.

Iraqi scientists concurrently investigated almost every viable uranium enrichment technique. Documents seized by IAEA inspectors in 1991 revealed a broad-based Iraqi effort to design and develop a nuclear weapon. In addition, in August 1995, the

Iraqis admitted that they had established a crash program to build a nuclear weapon by April 1991.

Iraq's nuclear weapon design and development work, which was supported by at least 16 primary and supporting facilities, was severely disrupted by Operation Desert Storm. Most of the facilities were in Baghdad and the outskirts of the city, but others were in Mosul in the north and Al Qaim and Akashat in the west near the Syrian border.

The extent and sophistication of the Iraqi nuclear weapon program uncovered by UN and IAEA inspectors surprised the international community. The diversity and broad scope of the Iraqi program prompted subsequent efforts to tighten up the IAEA safeguards procedures and export controls.

CHEMICAL PROGRAM

Since the early 1980s, Iraq has produced several thousand tons of chemical agents, primarily at its main production facility in Samarra. Other chemical warfare-related facilities were located at Al

Habbaniyah. Iraq used some of its chemical weapons stockpile against the Iranians and the Kurds during the mid- to late-1980s. By the time it invaded Kuwait, Iraq probably had 1,000 metric tons of chemical agent on hand, split equally between blister agents and nerve agents. Also, it had become self-sufficient in producing many types of precursors, had produced a variety of chemical agents on its own, and had weaponized munitions with some of these agents.

DESTRUCTION OF IRAQ'S CHEMICAL ARSENAL

The chief inspector of the UN Special Commission chemical destruction group said on May 11, 1994, that all known Iraqi chemical munitions, agents, and precursors had been eliminated. The group had been destroying Iraq's chemical warfare stockpile at the Samarra chemical weapons complex since June 1992. Over 27,000 chemical-filled bombs, rockets, and artillery shells had been destroyed, to include 30 SCUD chemical warheads. About 500 tons of mustard and nerve agents, and thousands of tons of precursor chemicals, were burned off or chemically neutralized.



UN Chemical Destruction Facility at Samarra, Iraq.

UN Photo 159108/H Arvidsson

Iraq built its chemical program with assistance from Western sources, both individuals and companies, that supplied Iraq with vital chemical processing equipment, chemical precursors, and technical expertise. In the absence of UN monitoring or import controls, Iraq could revive a viable chemical weapon capability in a matter of months, despite war damage to its production and storage facilities. The Iraqis still have a domestic chemical industry, and converting some of these plants from producing chemicals to producing chemical warfare precursors and even agents would be relatively straightforward. Iraq retains the capability to deliver chemical agents using a variety of munitions, including artillery shells and rockets, aerial bombs, spray tanks, mortar rounds, and SCUD-type missile warheads.

Iraq's past use of chemical weapons demonstrates its willingness to ignore international norms of conduct. Iraq first used chemical agents in 1983, when Baghdad attacked Iranian military forces with mustard gas. In 1984, Iraq employed tabun-filled aerial bombs against Iran, making Iraq the first and only nation ever to have used a nerve agent on the battlefield. Iraq's successful integration of chemical weapons into offensive operations is widely accepted as one of the reasons for its victory over Iran in 1988. Baghdad used chemical weapons for their tactical and strategic value, not to mention their overwhelming psychological effect on Iranian forces. Iraq also used lethal chemical agents against its own Kurdish civilian population in 1988.

BIOLOGICAL PROGRAM

Iraq revealed to UN inspectors in August 1995 that it had a far more extensive and aggressive biological warfare program prior to the Gulf War than it had previously admitted. The Iraqis claim to have produced 90,000 liters of botulinum toxin and 8,300 liters of anthrax, as well as significant quantities of an agent that causes cancer. Further, the Iraqis claim to have loaded botulinum toxin and anthrax on SCUD missiles warheads and aerial bombs. Baghdad also admitted conducting research on mycotoxins and infectious viruses. The Iraqis claimed in August 1995 that they destroyed the agents after the Gulf War (January-February 1991), but have yet to produce evidence to support their claim.

Since the end of Operation Desert Storm, Iraqi declarations and UN inspections have exposed an extensive dual-use fermentation capability and additional facilities probably linked to the weapons program. Because of their dual-use nature, most equipment and procedures related to producing biological agents are rationalized as legitimate agriculture, biomedical, and biotechnical industrial activities.

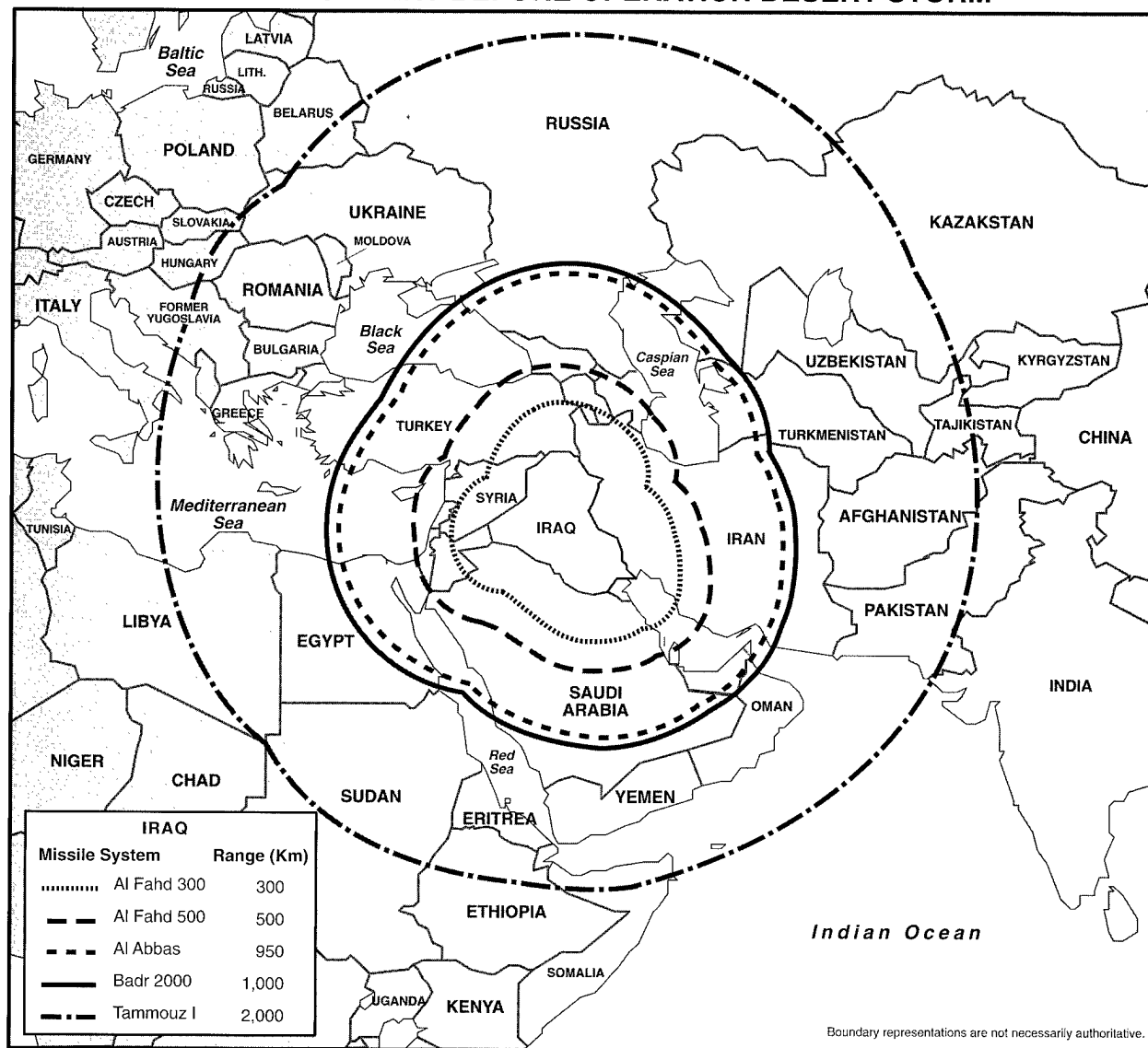
Coalition air strikes destroyed or damaged many of Iraq's facilities associated with biological warfare, including those at Al Kindi and Salman Pak. However, before the Coalition operations began, the Iraqis had relocated virtually all of their agent production equipment to Al Hakam and other facilities. All known fermentation and bioproduction equipment remains intact, and key experts are still available to serve Iraq's military programs. Consequently, Iraq retains the infrastructure that previously developed and produced biological warfare agents and weapons, and could easily renew production of biological agents when intrusive UN inspections are discontinued.

BALLISTIC MISSILES

Soviet SCUD missiles were the basic building block of Iraq's missile development program. During the late 1980s, Baghdad began to enlarge the propellant tanks and reduce the SCUD warhead weight to reach targets beyond the missile's 300-kilometer maximum range. Iraq also focused on a domestic manufacturing capability for these modified SCUDs, as well as the Badr 2000, a solid-propellant missile based on the Argentine Condor, with a 750-1,000-kilometer range. Baghdad also had plans for a 2,000-kilometer range missile, called the Tammouz I. As a result, by the start of Operation Desert Storm, Iraq had in place a support structure for the eventual manufacture of liquid- and solid-propellant ballistic missiles.

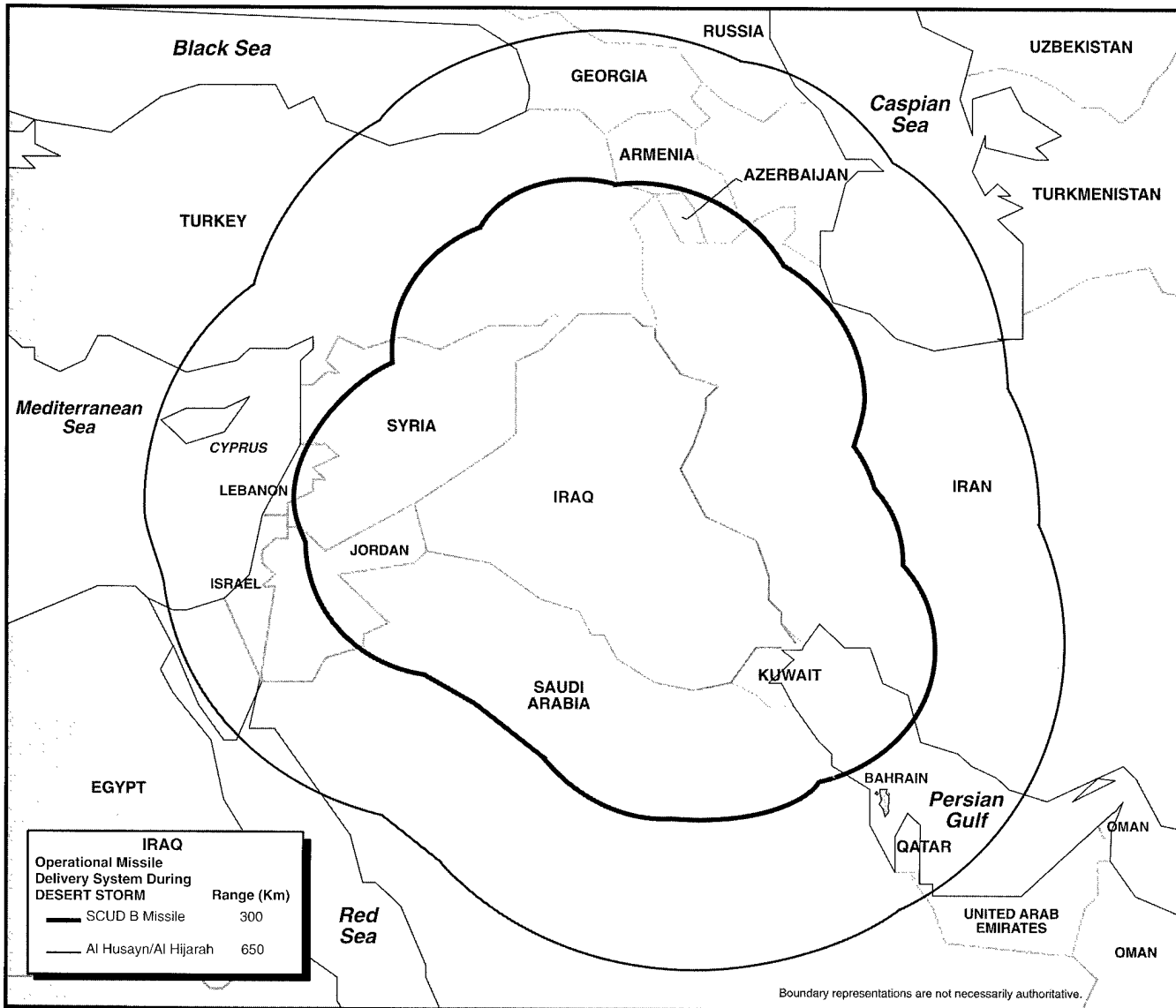
The principal missile launched during Operation Desert Storm was the 600-650 kilometer SCUD variant called the Al Husayn. A variant of the Al Husayn was also produced, known as the Al Husayn Short. The Iraqis claimed to have fired another SCUD variant, the Al Hijarah, which may have had a concrete-filled warhead, at Israel during Operation Desert Storm.

MISSILES IN DESIGN OR RESEARCH AND DEVELOPMENT BEFORE OPERATION DESERT STORM



Missile	Iraqi Declarations to the UN
Al Fahd 300	Intended range of 300 km. Based on converting the Russian SA-2 surface-to-air missile (SAM) into a ballistic missile. Abandoned in research and development.
Al Fahd 500	Intended range of 500 km. Displayed at 1989 Baghdad Arms Exposition. A mock-up for a disinformation campaign that never reached the design phase.
Al Abbas	Claimed range of 950 km. Longer in length and carried a lighter payload than the Al Husayn. Abandoned during research and development.
Badr 2000	Intended range 750-1,000 km. Solid-propellant, 2-stage. Based on Argentine Condor missile. Facilities constructed to support missile production. Under research and development.
Tammouz I	Claimed range 2,000 km. Based on SCUD technology with SA-2 SAM sustainer for second stage. In design stage, but not developed further for research and development.
Al Abid	A 3-stage space launch vehicle. First stage consisted of 5 Al Abbas airframes. Test launch of first stage in December 1989.

OPERATIONAL IRAQI MISSILE FORCE DURING OPERATION DESERT STORM



	Range (kilometers)	Number Launched
SCUD-B	300 km	0
Al Husayn	600-650 km	84
Al Husayn-Short	600-650 km	3
Al Hijarah	600-650 km	1

**CURRENT IRAQI SURFACE-TO-SURFACE ROCKET AND
BALLISTIC MISSILE SYSTEMS PERMITTED UNDER UNSCR 687**

Type	Country of Origin	Range (km)	Status and Remarks
LUNA/FROG-7	Russia	70	In service; limited potential for range extension.
Astros II	Brazil	60	In service; limited potential for range extension.
SA-2 (potential SSM)	Russia	Unknown	Currently widely used in Iraq as a SAM. Iraq aware of Chinese ability to convert SA-2s into surface-to-surface missiles (SSMs).
SA-3 (potential SSM)	Russia	Unknown	Also used widely as a SAM in Iraq. Iraq tried to convert the SA-3 to an SSM prior to the Gulf War, but failed. No evidence that the program has been revived.
Ababil-50	Iraq	50	Entering service in limited numbers. Potential for range extension probably limited.
Ababil-100	Iraq	100-150	In development, with parallel solid- and liquid- propellant versions being considered. Great potential for range extension.

Even though most of Iraq's missile production facilities received heavy damage during the Gulf War, Baghdad maintains some of the equipment needed to produce ballistic missiles, in part because of the dual-use nature of much of the equipment required for producing SCUDs. Today, Iraq's production efforts are focused on developing the Ababil-100, with an estimated maximum range of 150 kilometers, and the Ababil-50, a Yugoslav-designed 50-kilometer range battlefield artillery rocket. Many of the Ababil-100 liquid-propellant missile production technologies are compatible with SCUD production.

UNSCR 687 prohibits Iraqi possession of missiles with a range greater than 150 kilometers. Nevertheless, the United States believes Iraq has hidden a small number of mobile launchers and several dozen SCUD-type missiles produced before Operation Desert Storm.

CRUISE MISSILES AND OTHER MEANS OF DELIVERY

Iraq has Chinese land-based and air-launched anti-ship cruise missiles. Although its stockpile is likely limited, Iraq used French air-launched and Chinese land-based and air-launched missiles during the

Iran-Iraq war. Iraq enhanced its anti-ship capability by forward-deploying aircraft and by using aerial refueling to strike oil tankers in the Strait of Hormuz. Iraq still possesses a variety of other platforms capable of delivering both chemical and biological weapons, including artillery and tactical rockets, combat aircraft and helicopters.

Libya

Libya has a long history of subverting and destabilizing Arab and African nations by supporting coups, funding and training opposition forces and guerrilla groups, and plotting the assassinations of foreign leaders. Qadhafi has invaded, occupied, and/or claimed territory in all of Libya's neighbors except Egypt. He has at times supported foreign Islamic extremists, and he has frequently criticized Arab governments that have attempted to open dialogue with Israel.

Under Qadhafi's leadership, Libya remains a potential threat to the international community and neighboring states. While pursuing his political and military aspirations, he has squandered the country's oil wealth on a program for NBC weapons, missiles, and an enormous inventory of conventional military equipment. Since seizing power in

1969, Qadhafi has unsuccessfully attempted to turn the Libyan state into a regional military power.

Qadhafi has demonstrated both his desire to acquire ballistic missiles and an NBC weapon capability as well as his willingness to use the capabilities at his disposal. In 1987, when his military operation against Chad was nearing defeat, Qadhafi ordered his forces to use chemical agents against Chadian troops. In response to U.S. retaliatory strikes for the terrorist bombing of a Berlin discotheque, Qadhafi fired SCUD missiles at the Italian island of Lampedusa. Although the SCUD missiles did not cause significant damage, the act constituted a symbolic gesture of defiance directed at the United States and the international community. Finally, and more importantly, Qadhafi has ordered kidnappings and both supported and employed international terrorism against Western nations.

NATIONAL OBJECTIVES

Qadhafi, who remains largely unchallenged as Libya's leader, controls nearly all policy decisions for his country. His aim is to enhance Libya's military strength and power projection capability, in part by possessing NBC weapons and missiles. Qadhafi apparently believes these efforts promote Libya's status as a regional military power, enhance national prestige, and provide Libya limited strategic military capabilities.

RESOURCES

Libya probably dedicates several hundred million dollars annually to acquire NBC weapons and missiles, made possible by its substantial income from oil and natural gas exports. However, since it does not have the ability to produce these weapons on its own, Libya will continue to rely heavily on foreign technical assistance.

STRATEGY

Qadhafi's efforts to become a recognized military power in the region have been generally unsuccessful. Despite accumulating a large military inventory, Libya has failed to develop its conventional military capabilities, as evidenced by its embarrassment at the hands of Chadian forces in the 1980s.

Even though Qadhafi has been successful in holding on to power in Libya, he has not become a regional leader. His numerous schemes to form political unions with other Arab states have failed, and his support of insurgent and opposition movements has done little to enhance Libya's standing or further its policy agenda. Qadhafi's continued support for terrorism has resulted in an extended confrontation with the United States and, more recently, has prompted United Nations sanctions.

As a result of these setbacks, Qadhafi has placed greater emphasis on a more dangerous strategy: developing NBC weapons and missiles. Qadhafi views these weapons as critical in his drive to establish himself as the leader of the Arab world. In addition, he hopes that ongoing efforts to develop and ultimately produce NBC weapons, especially nuclear weapons, will give his nation prestige among Islamic and other Third World nations, recognition he has sought for three decades.

NUCLEAR PROGRAM

Qadhafi's long-standing desire to acquire a nuclear weapon is well-known. Nonetheless, despite concerted efforts, Libya's program to establish an independent nuclear research and fuel cycle capability remains in its early stages. Despite Libya's public pronouncements of its peaceful intent, the underlying motivation behind this program continues to be acquiring nuclear weapons.

Libya deposited its instruments of ratification to the NPT in 1975 and its declared facilities are under IAEA full scope safeguards. Libya's rudimentary nuclear program includes a small research reactor, provided by the Soviet Union in the mid-1970s, at the Tajura nuclear research center near Tripoli. Waning commitments by Russia to provide assistance to operate and maintain the center have diminished activities at the site. To compensate, and to build up its indigenous resources, Libya continues to send scientists abroad for training and actively recruits foreign nuclear scientists and technicians. However, Libya's program lacks well-developed plans, technical expertise, consistent financial support, and sufficient support from foreign suppliers.

SELECTED NUCLEAR AND CHEMICAL FACILITIES



While progress for its nuclear weapons program has remained elusive, Libya has had greater success in producing chemical agents.

CHEMICAL PROGRAM

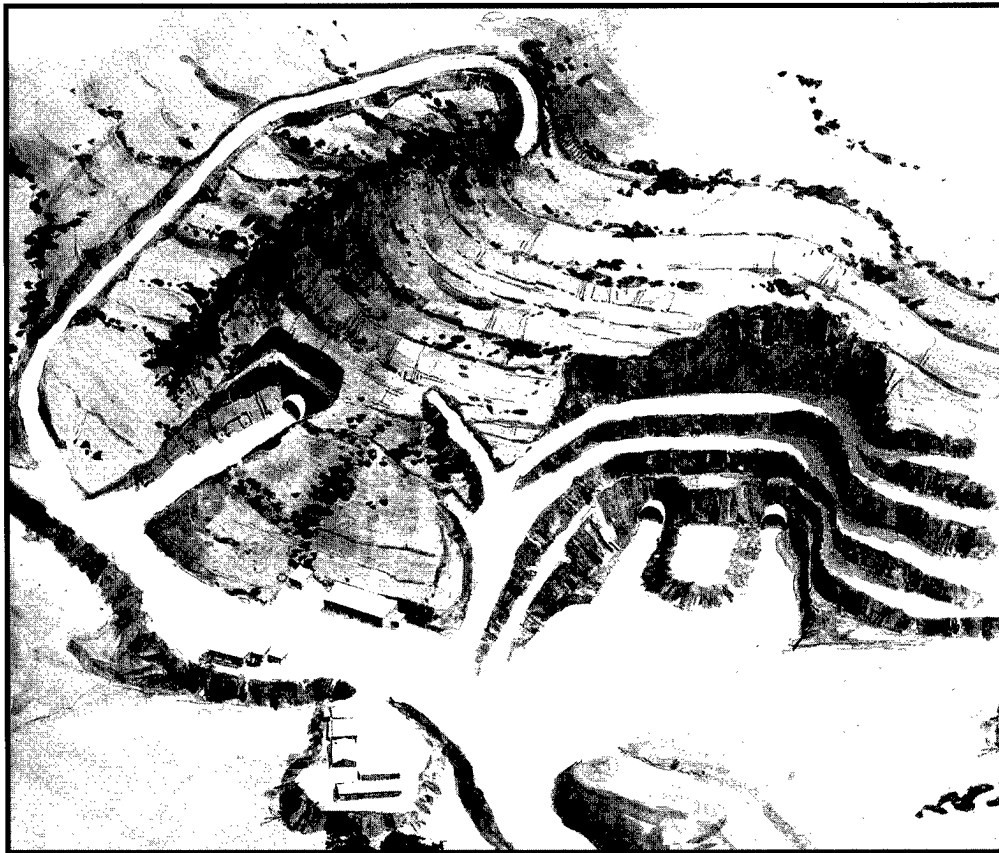
Libya is one of few nations in the last decade to have employed chemical weapons, having dropped chemical agents from a transport aircraft against Chadian troops in 1987. Iran supplied the agents in exchange for naval mines.

In addition, Tripoli has looked to establish an indigenous chemical warfare program, and in late 1988, with extensive foreign assistance, completed construction of the Rabta chemical agent facility. During three years of operation, at least 100 metric tons of blister and nerve agents were produced at this facility. When the United States brought

Libya's chemical warfare program to the attention of the international media in 1988, Libya responded in 1990 by fabricating a fire to make the Rabta facility appear to have been seriously damaged.

Although the Rabta facility appears inactive, Libya's chemical weapons program continues to flourish. To replace the Rabta facility, Libya has begun constructing a large, underground chemical warfare plant near Tarhunah, a mountainous region about 60 kilometers southeast of Tripoli. Putting the facility underground masks its activities and increases its survivability in case of an attack. In the meantime, Libya will rely on foreign sources for its precursor needs.

TARHUNAH UNDERGROUND CHEMICAL PLANT



Past international attention on Libya's Rabta chemical facility led the Libyans to construct an underground facility at Tarhunah.

Libya claims it will not sign the CWC as long as other countries in the region possess NBC weapons. Libya almost certainly will keep its chemical warfare program as long as Qadhafi remains in power.

BIOLOGICAL PROGRAM

Libya continues its efforts to establish a biological warfare capability. However, hampered by its inadequate biotechnical foundation, the Libyan offensive biological warfare program remains in the early research and development stage. Libya may look to small research and development programs supported by universities to fill in the gaps in its technical knowledge. These technical shortcomings, combined with limitations in Libya's overall ability to put agents into deliverable munitions, will

preclude production of militarily effective biological warfare systems for the foreseeable future.

BALLISTIC MISSILES

Libya's only operational ballistic missile system is the SCUD-B, acquired from the former Soviet Union in the mid-1970s. The acquisition of an extended-range missile, such as the North Korean NODONG, and the development of an indigenous missile — designed to reach 1,000 km — would give Libya the capability to reach regional adversaries.

International constraints make purchasing a longer range missile, such as North Korea's NODONG, difficult. In addition, developing an indigenous ballistic missile production program also requires extensive foreign assistance. So far, Libya's

program has made slow progress in its 13-year history, and has succeeded only in manufacturing liquid-fueled rockets with an approximate range of 200 kilometers. However, despite this lack of dramatic gain, the program continues to receive government support.

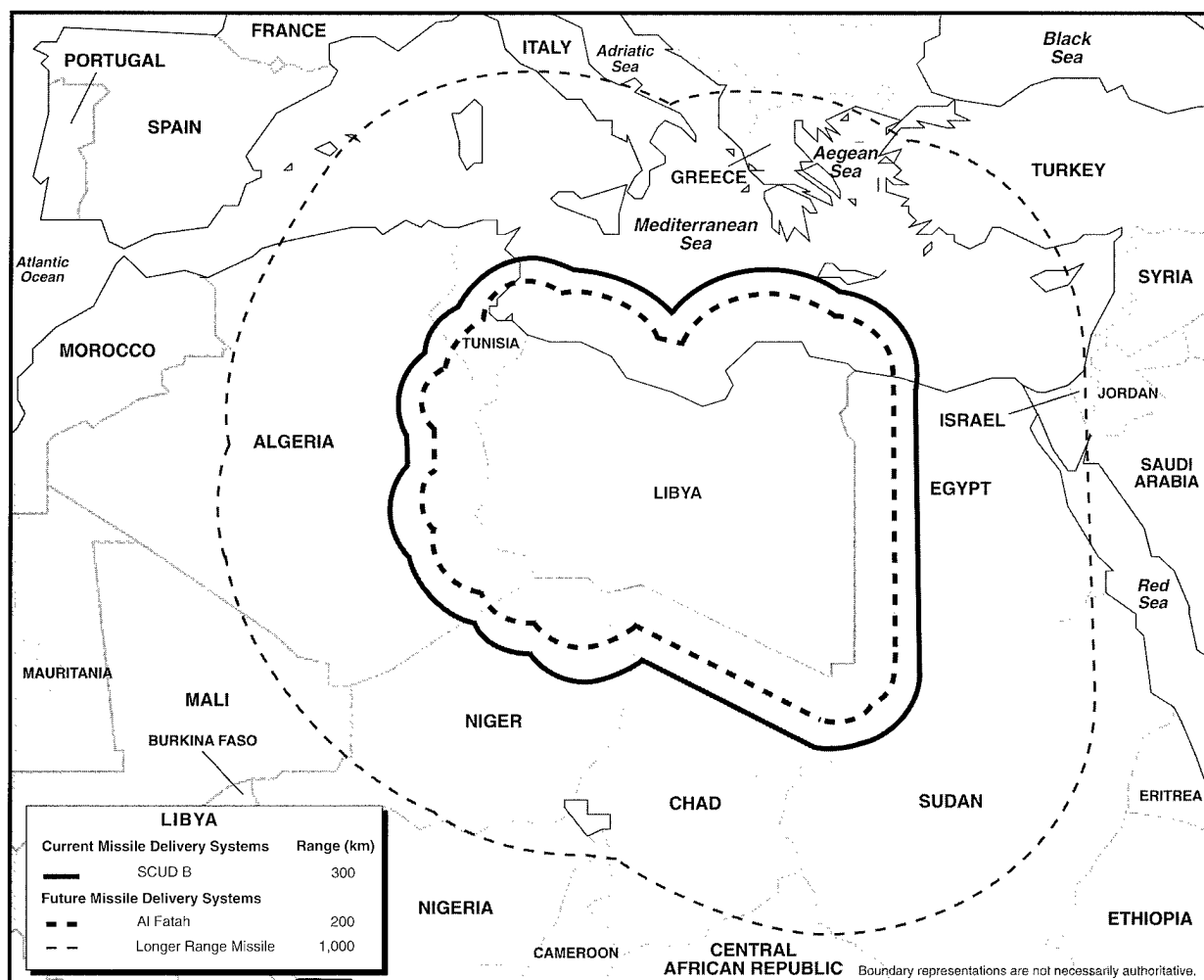
In addition to its liquid-fueled rocket program, Libya also may pursue testing and production of solid-propellant tactical rockets and missiles. Although UN sanctions have impeded its ability to obtain the technologies it needs for these programs,

Libya continues its research and development efforts aimed at acquiring ballistic missiles.

CRUISE MISSILES AND OTHER MEANS OF DELIVERY

Libya has Soviet-made shipborne and European-made land-based and shipborne anti-ship cruise missiles. Libya has artillery and tactical rockets, as well as several aircraft that could deliver chemical agents, including MiG-23, Su-22, and Su-24 fighters; Tu-22 bombers; Mi-2 and Mi-8 helicopters; and AN-26 transports.

CURRENT AND FUTURE BALLISTIC MISSILE SYSTEMS



Should Libya acquire a longer range missile, such as the North Korean NODONG, it would have the capability to strike southern Europe and Israel.

THE FORMER SOVIET UNION: RUSSIA, UKRAINE, KAZAKSTAN, AND BELARUS



Nations of the Former Soviet Union

GOALS AND INTERESTS

The fundamental interests of the United States regarding Russia and the independent states of the former Soviet Union, as articulated by President Clinton, are to reduce the nuclear threat, to support the development of these states as stable democracies, and to assist them to establish market economies.

Within these broad foreign policy goals, the United States has five primary national security interests in this region: implementing START I and II and all other arms control agreements, and safeguarding the enormous nuclear arsenal that is the legacy of the Cold War; deterring the use of nuclear weapons should a strategic reversal occur in the former

Soviet Union and a regime emerge which is hostile to U.S. interests; preventing the proliferation of NBC weapons; maintaining regional stability in and among the nations of the former Warsaw Pact; and avoiding reestablishing an antagonistic global rivalry with Russia.

THE PROLIFERATION CHALLENGE: CAPABILITIES, INTENTIONS, AND TRENDS

From the former Soviet Union, Russia has inherited the largest stockpile of NBC weapons and delivery systems in the world. Although additional strategic weapons are still deployed in the new independent states of Ukraine and Belarus, these weapons are under Russian control. Russia's public statements

and actions regarding the safety, security, and dismantlement of this massive inventory and commitment to cease all offensive BW activities have been positive, although Moscow still needs to fully implement these commitments, and its adherence to some proliferation control norms has been uneven.

The magnitude of the numbers, the complexity of weapons systems to be moved, dismantled, or destroyed, and the vast distances involved have been and will continue to be daunting challenges to Russia and to U.S. interests for several years to come. In the face of serious economic and political challenges, most of Moscow's actions regarding its strategic programs — and the actions of Ukraine, Kazakstan, and Belarus — demonstrate a commitment to denuclearization and nonproliferation. Nonetheless, the United States continues to have concerns about Russian biological and chemical warfare programs, including about information provided by Russia regarding those programs.

Russia, Ukraine, Kazakstan, and Belarus have stated publicly that they consider proliferation to be a potential threat to their own security. Although compliance with the various nonproliferation norms varies, turbulent political, social, and economic conditions continue to complicate their nonproliferation efforts. Additionally, scientists and technicians may be enticed to emigrate by money from abroad, and could provide critical knowledge to develop such weapons to nations with emerging NBC weapons programs. Furthermore, crime and corruption are significant threats to the security of nuclear materials. The December 1994 Czech seizure of highly enriched uranium (HEU) is one of several cases involving smuggled nuclear material that serves as a stark example of the need to safeguard these materials. These and other factors could have an adverse effect on Western efforts to prevent proliferation.

As a result of the break-up of the Soviet Union, Russia assumed control over thousands of strategic weapons. Russia is a party to the START I Treaty and has signed the START II Treaty that will reduce

significantly the size of its strategic forces. It is also removing nuclear weapons and delivery systems from Ukraine, Kazakstan, and Belarus, primarily for dismantlement.

In his February 1994 State of the Union Address, Russian President Boris Yeltsin described one of two priorities for Russia's national security as: "strengthening the arrangements governing the nonproliferation of mass destruction weapons and sophisticated technologies, and enhancing control over the international arms trade while watching over Russia's commercial interest in this sphere." Russia has continued to implement effective export controls on missile-related items, and in August 1995, Russia joined the MTCR.

Ukraine agreed in January 1994 to return the strategic nuclear warheads located on its territory to Russia for dismantlement in exchange for security assurances, compensation for the nuclear material in the warheads and expanded Western assistance. Ukraine has acted on its commitment by returning strategic nuclear weapons to Russia. In accompanying letters to the Lisbon Protocol, the former Republics of Ukraine, Kazakstan, and Belarus agreed to eliminate from their territory all former Soviet nuclear arms. In addition, Ukraine acceded to the NPT as a non-nuclear weapons state on December 5, 1994. This action fulfilled a Russian precondition for implementing START I, which entered into force on December 5, 1994. In May 1994, Ukraine signed a Memorandum of Understanding with the United States, committing itself to adhere to MTCR Guidelines.

Kazakstan also faces major challenges, but has demonstrated its commitment to denuclearization and nonproliferation in several important ways. It ratified START I and the Lisbon Protocol in 1992 and acceded to the NPT as a non-nuclear weapons state in 1993. Also, Kazakstan informed the United States about a vulnerable cache of approximately 600 kg of HEU and cooperated with a joint Department of Defense/Department of Energy team in removing the cache from Kazakstani soil for safe and secure storage in the United States.

Kazakstan had returned to Russia all the strategic nuclear warheads on its territory by April 1995. Kazakstan does not possess, nor can it afford to acquire, the infrastructure needed to maintain and operate a nuclear force.

President Nazarbayev's Comments on Denuclearization

March 24, 1994

"Kazakstan is fulfilling its pledges for the elimination of nuclear weapons. We were the first CIS state to ratify START I and the Lisbon Protocol. The only delays were due to the fact that we were trying to secure guarantees that this is our lawful property and that we will be compensated for the cost of the enriched uranium."

Kazakstan inherited a small amount of the Soviet Union's defense industrial facilities. The outlook for Kazakstan's defense industry remains bleak. There is limited demand for weapons internally; few of the military systems are exportable; and most importantly, Russian orders have been drastically reduced. However, Russia and Kazakstan will retain close military ties through a series of military cooperation agreements, encompassing Moscow's 20-year lease of the Baikonur Cosmodrome (Tyuratam Space Missile Test Center), and various military test ranges.

Belarus is also committed to denuclearization. In February 1993, its parliament ratified the START Treaty and the Lisbon Protocol, and acceded to the NPT as a non-nuclear weapons state, thereby codifying Belarus' intent to become nuclear-free. Also, Belarus and Russia have agreed that the withdrawal — already underway — of nuclear weapons and support equipment located in Belarus will be completed by the end of 1996. Further, in an effort to provide evidence of its commitment to nonproliferation, Minsk is cooperating with the United States on improving the Belarus export control system.

OPERATIONAL STRATEGIC NUCLEAR WARHEADS

	1991	1995
Russia	7,327	6,530
Ukraine	1,512	300
Kazakstan	1,360	0
Belarus	81	18
Total	10,280	6,848*

* 33% reduction

OPERATIONAL STRATEGIC NUCLEAR DELIVERY VEHICLES

	1991	1995
Russia	2,074	1,345
Ukraine	210	50
Kazakstan	144	0
Belarus	81	18
Total	2,509	1,413*

* 44% reduction

Nuclear Programs

Russia's immediate challenge is to account for and control the approximately 27,000 tactical and strategic nuclear warheads that it inherited from the former Soviet Union. Moscow maintains strong operational launch control of the strategic nuclear weapons it inherited. However, the large number of tactical nuclear weapons and the need to protect them from theft or sale are serious security and proliferation concerns.

Russian statements and actions are consistent with the large-scale dismantlement efforts now underway. These efforts will generate tons of recovered weapons-grade plutonium and hundreds of tons of highly enriched uranium by 2004. The United States has contracted to buy low enriched uranium (LEU) from 500 metric tons of HEU from dismantled weapons. In addition, weapons dismantlement requires Russia to construct new, or refurbish old, storage facilities for this fissile material. Frequent and often long-distance movements make the materials vulnerable to loss or theft during transit between sites within Russia, as well as from Belarus and Ukraine to sites in Russia.

Additionally, serious concerns exist regarding the potential for illegally acquiring and trafficking in industrial nuclear and radioactive materials, which are commercially available in Russia. This type of material is particularly vulnerable to theft from nuclear power plants and research facilities.

By May 1992, all tactical nuclear weapons had been removed from Ukraine to Russia. Further, on January 14, 1994, the presidents of Russia, Ukraine, and the United States signed a statement regarding the withdrawal and dismantlement of all remaining strategic nuclear weapons in Ukraine. One month later, Moscow and Kiev reached a further understanding concerning specific measures to implement the January statement. In December 1995, Ukrainian officials said that about 1,410 warheads had been removed from their country. All warheads probably will have been withdrawn by mid-1996.

By April 1995, all nuclear weapons had been withdrawn from Kazakstan. This occurred under a March 1994 bilateral agreement between Almaty and Moscow. The ICBM airframes that remain in Kazakstan probably will be withdrawn in 1996.

Belarus has agreed with Russia to return the nuclear weapons located on its territory. These weapons include tactical nuclear weapons withdrawn by July 1992 and the SS-25 ICBMs and their associated nuclear warheads being withdrawn currently. As of December 1995, only 18 SS-25 missiles and warheads remained in Belarus. Belarus is expected to complete all SS-25 withdrawals by the end of 1996.

Chemical Programs

The United States has a number of questions and concerns regarding the chemical warfare program Russia inherited from the Soviet Union. Russia has the largest and most advanced chemical warfare program in the world and maintains a considerable stockpile of nerve, blister, and choking agents. Moscow has repeatedly stated that its chemical weapons stockpile consists of 40,000 metric tons of toxic agents in weapons and in bulk storage. A consolidation effort has been underway since the mid-1980s, and President Yeltsin declared in January 1992 that all former Soviet chemical weapons had been transferred to Russian territory.

Russia has signed but not yet ratified the CWC. Under the Convention, Russia would be obligated to destroy its stockpile of chemical weapons and destroy or, consistent with CWC requirements, convert former chemical weapons production facilities to peaceful purposes.

Currently, Russia has no large-scale chemical warfare destruction facilities and is unlikely to begin full-scale destruction before the late 1990s. The Russian chemical warfare destruction program has been stymied by delays in formulating a plan, building facilities, obtaining needed foreign technical and financial assistance, and obtaining legislative approval.

Ukraine, Kazakstan, and Belarus have no known chemical warfare programs and no intention of establishing them.

Biological Programs

The United States continues to have concerns about Russian compliance with the Biological Weapons Convention, despite President Yeltsin's decree in April 1992 banning all activities contravening the Convention. Russia may be retaining capability for the production of biological warfare agents. The Soviet Union's offensive biological warfare program employed thousands of its best scientists at numerous facilities, almost all of which are located in Russia. In addition, as with its nuclear materials, Russia's biological warfare technology may be vulnerable to leakage to third parties.

Ukraine, Kazakstan, and Belarus have no known biological warfare programs and no intention of establishing them.

Ballistic Missiles

Some 1,300 ICBMs and SLBMs are deployed in Russia. In addition, another 50 deployed operational ICBMs are located in Ukraine and slated for dismantlement, and the 18 ICBMs remaining in Belarus are to be returned to Russia. Many Russian ICBMs and SLBMs are slated for dismantlement under START I, and more will be destroyed under START II. Russia also has an inventory of SCUD-B and SS-21 SRBMs.

Russia inherited the bulk of the Soviet Union's ballistic missile industrial base and remains capable of developing and producing the full range of both solid- and liquid-propellant ballistic missiles, and all associated technologies.

In Ukraine, since mid-1993, about 75 percent of the ICBM warheads have been removed from active status and, as of December 1995, Ukrainian officials said that about 1,410 ICBM and air-launched cruise missile (ALCM) warheads have been returned to Russia. Under the Trilateral Statement signed January 14, 1994, all the warheads associated with these ICBMs, as well as those from ALCMs, are to be transferred to Russia for dismantlement. We expect all warheads will probably be transferred by mid-1996.

Ukraine also has an inventory of SCUD-B and SS-21 SRBMs, as well as fighter and bomber aircraft that could be used to deliver NBC weapons. It has extensive and highly developed missile production capabilities and has indicated intense interest in developing an indigenous space launch vehicle program.

In April 1995, the Russians announced that all nuclear warheads had been removed from Kazakhstan, thereby removing all ICBMs in Kazakhstan from operational status. Moscow will probably remove the remaining ICBM airframes and support equipment from Kazakhstan well before the 1997 agreed deadline. While Kazakhstan also has an inventory of SCUD-B SRBMs, strategic aircraft which had been based in Kazakhstan have already been redeployed to Russia. With material and technical assistance from Russia, Kazakhstan has the capability to continue producing ballistic missiles and launchers, but has put a high priority on converting the former missile production facility at Petropavlovsk. Additional ballistic missile assembly technology and expertise is available at the Baikonur Cosmodrome (Tyuratam Space Missile Test Center), which remains under Russian control.

In Belarus, as of December 1995, 63 SS-25 ICBMs originally deployed there have been returned to Russia. As of December 1995, Belarus had two operational SS-25 mobile ICBM regiments remaining on its territory, with a total of 18 nuclear warheads. In July 1992, Belarus signed an agreement with Russia placing the regiments under exclusive

Russian control. In September 1993, Moscow and Minsk signed an agreement requiring the return of these nuclear missiles and all related missile support equipment to Russia by the end of 1996. After withdrawal from Belarus, these SS-25s will be stored or deployed in Russia. Belarus also has an inventory of SCUD-B and SS-21 SRBMs, which it will retain.

Belarus has a variety of aircraft capable of delivering NBC weapons. It has no capability to produce missiles, but does produce the chassis for road mobile missile launchers.

Cruise Missiles and Other Means of Delivery

The states of the former Soviet Union inherited the largest inventory of cruise missiles in the world. The majority of these missiles are now under Russian control, are located on Russian territory, and include large numbers of air-, sea- and land-launched systems. However, Ukraine, Belarus, and Kazakhstan have air-launched cruise missiles in their air forces, while Ukraine may have a small number of sea-launched and coastal defense cruise missiles under its control.

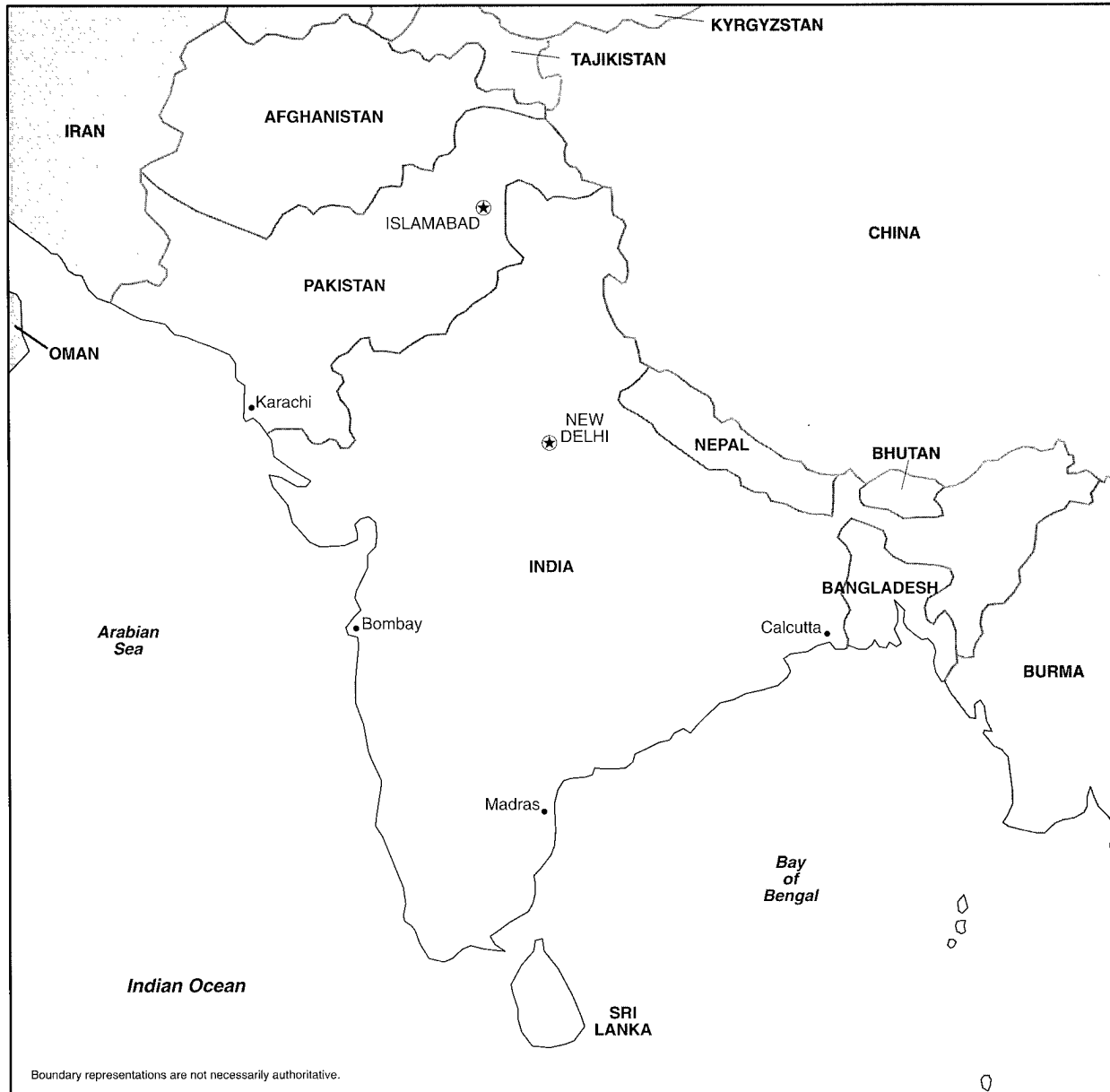
Implications

Russia's numerous cooperative actions with the West in international arenas is evidence that Russia's overall policy appears to support nonproliferation actions. Further, Russia's military doctrine lists proliferation of NBC weapons as a threat to its own security. Russia has made some progress in designing a system to control the sale of sensitive technologies. Moscow has established lists of controlled items and developed official procedures governing their potential sale. Serious concerns remain, however, ranging from certain Russian exports policies to effective security measures for fissile material. To date, theft has focused primarily on small arms and military goods that are readily convertible to cash. Interest in the theft of advanced weapons, critical components, and weapons-grade fissile materials has been highlighted by several incidents in 1994 involving the smuggling of nuclear material.

Uncertainty persists concerning the long-term implications of other types of technology transfers, despite recent Russian actions to monitor and control illegal proliferation. The emigration of Russian scientists, engineers, and technicians with experience in NBC weapons and missile development

technologies could provide certain nations with access to critical research or production know-how and thereby accelerate their acquiring such capabilities. Finally, recent Russian declarations regarding the extent of chemical and biological warfare programs have not been complete.

SOUTH ASIA



Nations of South Asia

GOALS AND INTERESTS

The United States has important security interests in South Asia, including preventing another Indo-Pakistani war and enhancing regional stability. Our nonproliferation goal is to persuade India and Pakistan to first cap, then reduce, and eventually

eliminate their capabilities to produce nuclear weapons and ballistic missiles. This approach supports our global objective to reduce and ultimately eliminate nuclear weapons. The consequences of a nuclear war between India and

Pakistan would be catastrophic, both in terms of the loss of life and for potentially lowering the threshold for nuclear use in other parts of the world, particularly the adjacent Middle East/North Africa region.

Deployment of ballistic missiles would pose especially troubling security risks given the relatively short distances between major population centers in South Asia and the brief time required for missiles to travel such distances. This factor will compress decisionmaking cycles for national leaders and battlefield commanders, reducing stability during times of crisis.

In addition to the immediate risks to regional security, the development of NBC weapons in South Asia has the potential to undercut broader U.S. and international nonproliferation objectives. Both India and Pakistan, for different reasons, have refused to sign the NPT. Their nuclear programs, outside of this widely accepted international norm, serve as dangerous examples for nations in other regions.

The NBC weapons and missile infrastructures in South Asia also pose potential proliferation threats, as possible sources of supply. India and Pakistan's slowness to adopt export controls consistent with established international control regimes is reason for concern. As each nation continues its programs, the danger of transferring technology to states outside the region remains possible.

THE PROLIFERATION CHALLENGE: REGIONAL CAPABILITIES, INTENTIONS, AND TRENDS

India and Pakistan

The bitter rivalry between India and Pakistan, which dates to the partitioning of the subcontinent in 1947, remains the impetus behind the proliferation of NBC weapons and missiles in the region. The security dynamics of the region are complicated further by India's perception of China as a threat. Pakistan's efforts to develop NBC weapons and missile systems are intended primarily to counter India's substantial conventional military advantage and its perception of India's nuclear threat.

India and Pakistan continue to cloak their NBC weapons programs in secrecy or deliberate ambiguity. Both continue to deny possessing nuclear weapons, while periodically issuing veiled threats alluding to their capability to employ these weapons if necessary. India and Pakistan deny possessing chemical and biological weapons, but point with pride to the progress of their indigenous missile development programs.

India's pursuit of nuclear weapons was first spurred by a 1962 border clash with China and by Beijing's 1964 nuclear test. New Delhi continues to view its northern neighbor as a long-term threat despite recently improved relations. It sees Pakistan's NBC weapons and missile capabilities as a more immediate threat. Nuclear rhetoric from Pakistani leaders and Islamabad's pursuit of a mobile SRBM capability reinforce India's perception that New Delhi continues to need a nuclear capability.

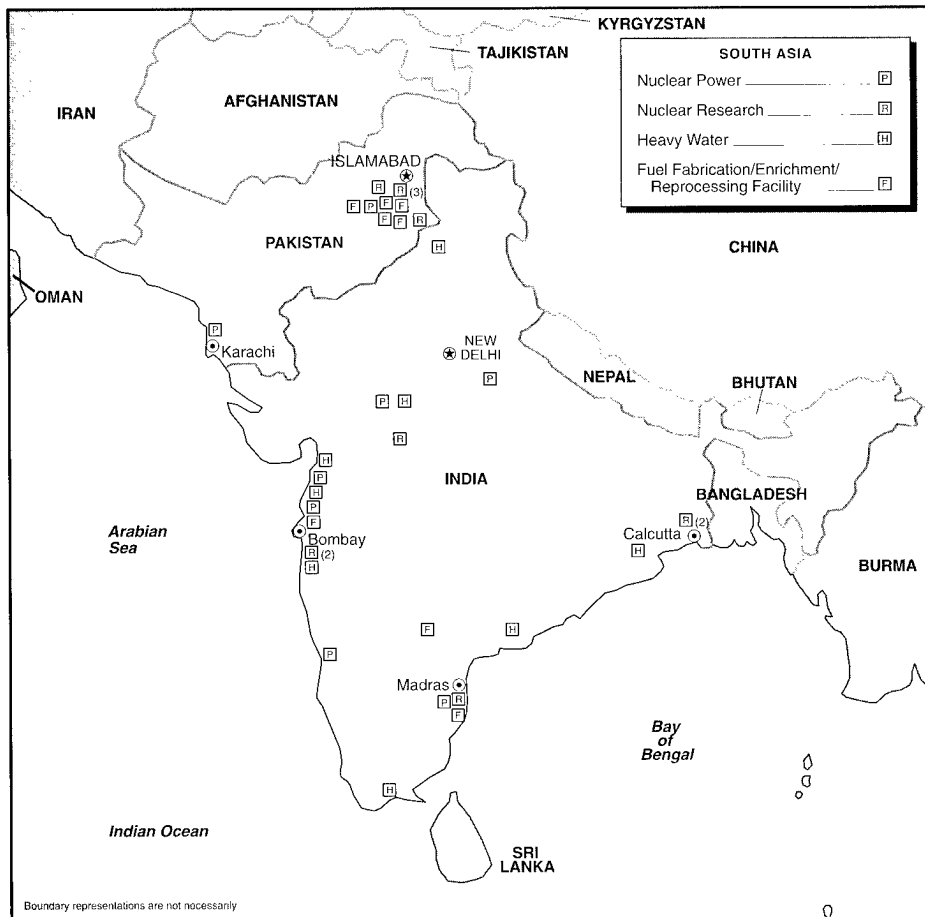
Pakistani leaders believe that a nuclear capability is essential to deter war with India, or failing that, to ensure the survival of the nation. Its nuclear program has widespread political and popular support. Missile procurement and development, initially to counter the Indian missile program which began in the mid-1980s, are driven by a desire to augment limited offensive air capabilities against India (which holds almost a 3:1 advantage in combat aircraft) and to field a more effective delivery system.

NUCLEAR PROGRAMS

India's very active nuclear energy development program has enabled it to obtain all of the essential materials and facilities for producing nuclear explosives. It has not signed the NPT, but is a member of the IAEA, and several Indian nuclear reactors are subject to IAEA safeguards.

India's program, older and larger than Pakistan's, included a nuclear detonation in 1974, described by India as a "peaceful nuclear explosion." India is currently capable of conducting another test within a short time of deciding to do so. It has an advanced nuclear program, with facilities to support the complete nuclear fuel cycle. India produced its stock of weapons-grade plutonium in reactors at the Bhabha Atomic Research Center near Bombay, which are not subject to IAEA safeguards.

SELECTED INDIAN AND PAKISTANI NUCLEAR FACILITIES



India's program, older and larger than Pakistan's, culminated in 1974 with a nuclear detonation and has progressed from there.

As additional indigenously-built nuclear power reactors become operational, India's capability to produce plutonium without safeguards will increase. India has the resources for producing and reprocessing plutonium and for enriching uranium. It also has the ability to conduct nuclear tests, which would support attempts to produce more advanced weapons. However, New Delhi's willingness to refrain from conducting additional nuclear tests could inhibit the development of such weapons.

India is believed to have a stockpile of fissile material sufficient for fabricating several nuclear weapons and could probably assemble at least some of these weapons within a short time of deciding to do so.

Pakistan began its nuclear weapons program in response to losing the 1971 war with India and accelerated it following India's 1974 nuclear test. Pakistan has not signed the NPT, but it has taken the public position that it would do so if India were to sign it also. Like India, not all of Pakistan's nuclear facilities are under IAEA safeguards.

Relying heavily on foreign assistance, Pakistan has developed a diverse, clandestine procurement network to support its weapons development effort. Although it has become increasingly self-sufficient in producing highly enriched uranium and in engineering and fabrication technologies, Pakistan will remain dependent on foreign suppliers for sophisticated materials and technical assistance

necessary to improve and expand its nuclear program. China remains an important supplier of nuclear technologies to Pakistan. In addition, Pakistan has acquired or attempted to acquire various materials and technology for nuclear weapons and peaceful applications from firms in the United States and Western Europe.

Most of Pakistan's nuclear research and development is conducted by its Atomic Energy Commission, which operates over a half-dozen facilities throughout the country. Three of Pakistan's operating nuclear reactors — the KANUPP power reactor in Karachi and the PARR I and PARR II research reactors near Islamabad — are under IAEA safeguards. The Chashma nuclear power plant, also near Islamabad, is under construction and also will be covered by IAEA safeguards.

Pakistan possesses all the components necessary for producing a nuclear device, and it probably has sufficient fissile material now to assemble a few nuclear weapons. In addition, Pakistan is building an unsafeguarded nuclear reactor that will provide it with a substantial capability to produce weapons-grade plutonium. It is expected to become operational in the late 1990s.

CHEMICAL AND BIOLOGICAL PROGRAMS

India and Pakistan are capable of developing chemical weapons. India, a signatory of the CWC, has never admitted to having an offensive chemical warfare program. India's large chemical industry produces many dual-use chemicals that could be used as precursors, and could support a chemical warfare program of considerable size.

Like India, Pakistan has signed the CWC, and can produce chemical agents and munitions. It has procured dual-use chemical precursors from foreign sources and hopes to achieve self-sufficiency in producing precursors.

While India possesses the infrastructure necessary to support an offensive biological warfare program, including highly qualified scientific personnel and industrial production facilities, it apparently has given priority to research and development applicable only to biological warfare defensive measures. Pakistan has the resources and capabilities appropriate to conducting research and develop-

ment relating to biological warfare. Both countries have signed the Biological Weapons Convention.

BALLISTIC MISSILES

India has one of the more self-sufficient ballistic missile programs in the developing world. It can design and produce missiles with little foreign assistance. However, New Delhi is working to become self-sufficient in all areas of production by the end of the decade. India has two ballistic missile programs — the Prithvi SRBM and the Agni MRBM. The Indians heavily used technological assistance and parts from Western firms in developing these missiles. The Prithvi is a single-stage, liquid-fueled missile using propulsion technology from the Soviet SA-2 surface-to-air missile, and is designed to be deployed with a payload of 1,000 kilograms to a range of 150 kilometers (or 250 kilometers with a 500-kilogram payload). The Indian Army has completed user trials with the Prithvi. The missile could quickly enter series production if a deployment decision were taken.

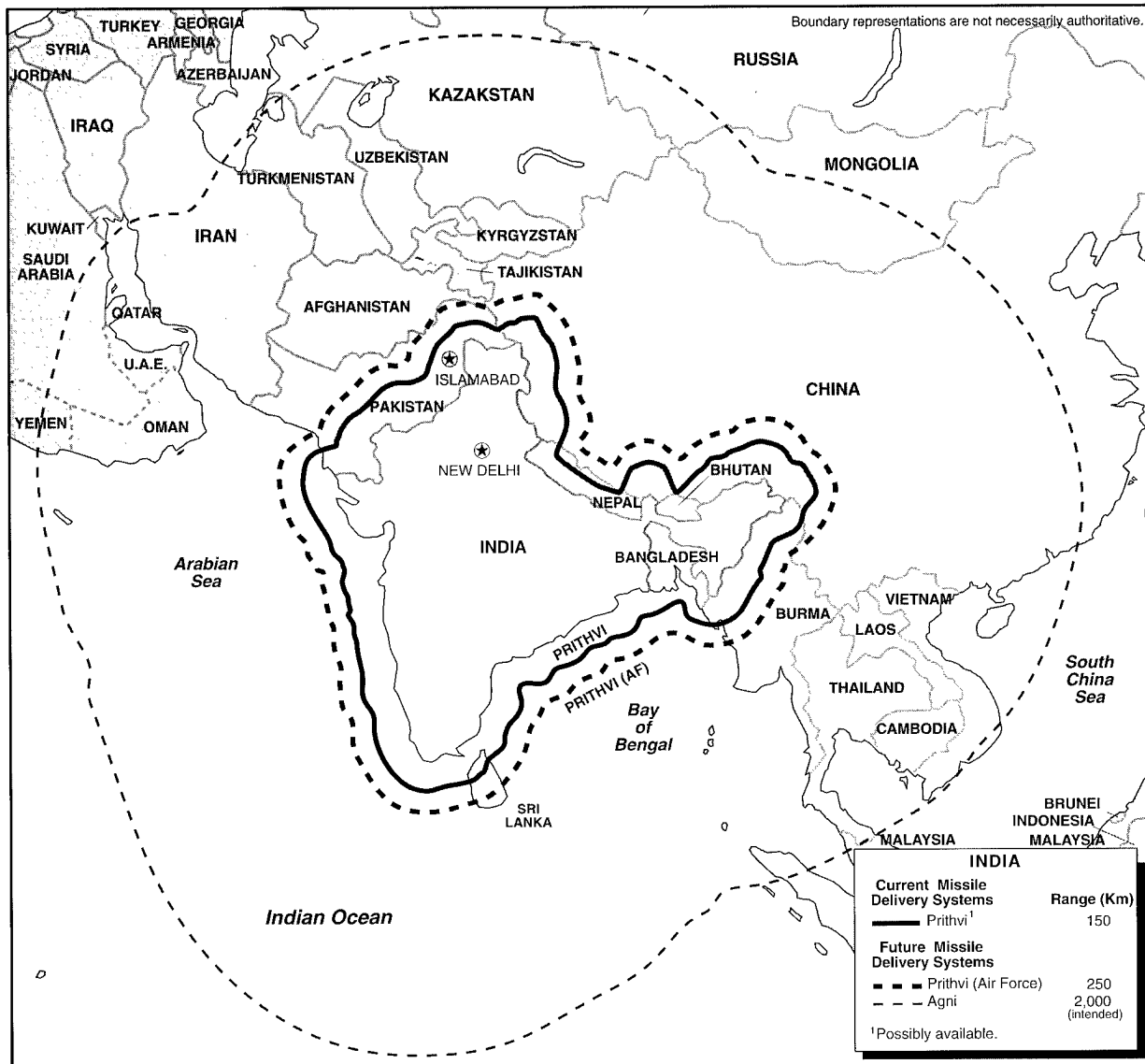
In 1994, India successfully tested the two-stage Agni; the missile achieved a range of 1,000 kilometers, about half its intended range. Publicly, the Indians call the missile a "technology demonstrator," although it could be used in developing a follow-on, longer range MRBM that could reach China.

Additionally, India has had an ambitious space launch vehicle (SLV) program since the mid-1970s. The program includes three SLVs, which have payload capacities ranging from 150 to 3,000 kg. India could convert these SLVs into IRBMs or ICBMs quite easily but has shown no indications of doing so. It has already built guidance sets and warheads, key components needed to convert an SLV into a ballistic missile.

The Indian space program shares research, development, and production facilities with the ballistic missile program. Therefore, New Delhi could apply the SLV technology it has obtained from the former Soviet Union and the West to its ballistic missile programs.

Pakistan has an SRBM industry that includes a large solid rocket motor production complex and a ballistic missile test facility. However, Pakistan's missile production capability is not as extensive as

RANGES OF CURRENT AND FUTURE BALLISTIC MISSILES



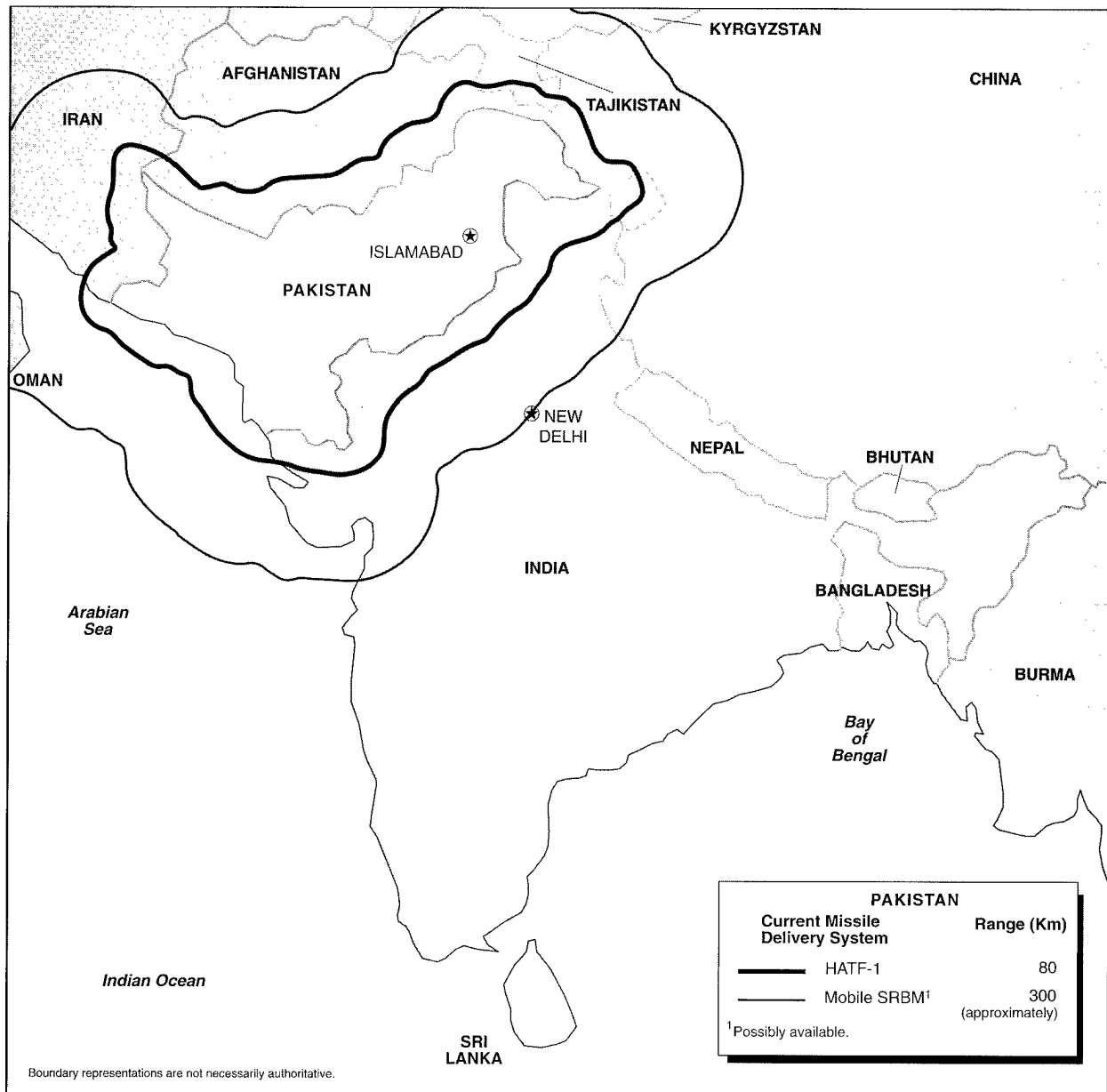
India's ballistic missile program grew out of its space launch program of the 1960s. Today, India has one of the more self-sufficient domestic missile production programs in the developing world. New Delhi will continue to be largely unaffected by multilateral control regimes, and denying access to related technology will delay, but not stop, efforts to improve missiles now in development.

India's. So far, it has produced only a few Hatf-I SRBMs, which have a range of 80 kilometers and are regarded as inaccurate.

China remains Pakistan's most important supplier of missile-related technologies. The United States imposed Category II sanctions against entities in

both countries in August 1993 for transferring M-11 related components and technology to Islamabad. In 1994, the sanctions against Beijing were lifted when China reaffirmed its bilateral commitment to the United States to adhere to the Missile Technology Control Regime and made a number of new, related commitments.

RANGES OF CURRENT AND FUTURE BALLISTIC MISSILES



Concerned over its ability to deliver weapons using aircraft, Pakistan is establishing a ballistic missile delivery option.

CRUISE MISSILES AND OTHER MEANS OF DELIVERY

India has Russian and British ship- and air-launched anti-ship missiles, while Pakistan has Chinese and U.S. ship- and submarine-launched and French air-launched anti-ship missiles. Because India is still developing ballistic missiles, combat aircraft

currently are its most viable delivery vehicles for nuclear or chemical weapons. The most likely platforms are the Mirage 2000, MiG-27, MiG-29, and Jaguar. Similarly, combat aircraft are Pakistan's most viable delivery means for NBC weapons, with the most likely platforms being F-16 and Mirage III fighters.

INDIA AND PAKISTAN: STATUS OF PROGRAMS

Nuclear Weapons	<ul style="list-style-type: none">* Both possess fissile material.
Chemical Weapons	<ul style="list-style-type: none">* India, with its large industrial base, can produce precursors for chemical warfare agents.* Pakistan must obtain precursors for chemical agent production.
Biological Weapons	<ul style="list-style-type: none">* Pakistan is conducting research and development with potential biological warfare applications.* India's efforts are geared towards defense.
Delivery Systems	<ul style="list-style-type: none">* Both have aircraft capable of delivering nuclear and chemical weapons.* Both are developing missiles.<ul style="list-style-type: none">** India: Has two missile programs:<ul style="list-style-type: none">– Prithvi – short range (150-250 km)– Agni – intended range (2,000 km)** Pakistan: Has two missile programs:<ul style="list-style-type: none">– Hatf I – short range (80 km)– Mobile SRBM – approximately 300 km range

THE TRANSNATIONAL THREAT: DANGERS FROM TERRORISM, INSURGENCIES, CIVIL WARS, AND ORGANIZED CRIME

Transnational groups of proliferation concern include terrorists, insurgents, opposing factions in civil wars, and members of organized criminal groups. Such groups are not generally bound by the same constraints and mores or motivated by the same factors as are nation-states, but pose significant threats to the interests of the United States and our allies and friends worldwide. Terrorist acts pose an especially potent threat to U.S. interests. When carried out by small, close-knit groups, these attacks are difficult to detect in advance, despite diligent intelligence efforts.

This category of proliferation threat is truly a global problem, cutting across all regions. The threat has been starkly demonstrated by the 1995 nerve gas attack in Japan, the bombing of the New York World Trade Center, and the increased involvement of criminal groups in the smuggling of nuclear materials. Furthermore, with numerous ongoing insurgencies and civil wars worldwide, there are additional dangers for escalation should NBC weapons or missiles be introduced to the conflict. Finally, there is an increased potential for leakage of NBC weapons or missile technology, or individuals with technological know-how. Such leakage would most likely occur between states that have reduced or dismantled their programs and states with programs under development.

TERRORIST GROUPS

Terrorist groups that acquire NBC weapons and stridently oppose U.S. policies could pose significant potential dangers to U.S. interests. Terrorists armed with these weapons can gain leverage for their demands because of the weapons' nature.

Terrorists might wish to obtain NBC weapons for a variety of motives. Such groups might threaten using NBC weapons as "saber rattlers" to raise the ante in response to Western political or military actions or to achieve a specific objective, but would risk losing its base of support.

Most terrorist groups do not have the financial and technical resources necessary to acquire nuclear weapons, but could gather materials to make radiological dispersion devices and some biological and chemical agents. Some groups have state sponsors that possess or can obtain NBC weapons. Nations such as Iran and Libya have backed numerous groups over the years, but no sponsor has yet demonstrated a willingness to provide such groups with NBC weapons, perhaps a testament to the looming and certain threat of retaliation should the state be identified as the supplier.

Terrorist acts involving NBC weapons represent a particularly dangerous threat that must be countered. The ability of terrorists to take the initiative in the choice of targets and timing of attacks significantly complicates our ability to combat this threat. U.S. policy in countering terrorism is four-fold: make no concessions to terrorists, use political and economic instruments to pressure states that sponsor terrorism, exploit fully all available legal mechanisms to punish international terrorists, and help other governments improve their capabilities to combat terrorism.

INSURGENTS AND CIVIL WAR FACTIONS

Insurgent groups and separatist movements, should they acquire NBC weapons or missiles, pose another potential threat to U.S. interests. Presently, there are dozens of insurgencies ongoing throughout the world. Insurgent groups aim to overthrow existing governments, thus destabilizing regional balances of power. In some cases, such groups have kidnapped U.S. citizens or conducted economic retaliation against U.S. commercial interests abroad. For the most part, these groups operate with unsophisticated weapons, receive little financial backing, and lack an industrial base to develop or produce NBC weapons or missiles.

The primary proliferation concern about insurgent groups is that they might capture such weapons, acquire them from sympathizers in the government's forces, or purchase them, possibly from

organized criminal groups. Insurgents might also attract sympathizers among knowledgeable scientists and technicians who might aid in developing weapons. Acquisition of such weapons could alter the regional balance of power and change the terms of conflict, if not its outcome, decisively.

Opposing factions in civil wars also could have access to NBC weapons and missiles. Such factions might be motivated to use these weapons as force multipliers to achieve quick and decisive victories. Factions could threaten or actually use the weapons against civilians for psychological and strategic effect. Tactically, the weapons might be used against a larger conventional force to disrupt staging or resupply efforts, thus prompting an evacuation of noncombatants.

Recently, opposing factions in two civil wars acquired and employed ballistic missiles with conventional warheads. After the Soviets withdrew from Afghanistan, Afghan rebel factions acquired a number of SCUD missiles, some of which the rebel groups fired at government forces in Kabul in January 1994. The second instance involved the Yemen civil war. During the spring of 1994, the

southern faction launched SCUD missiles against civilians in the northern cities of Sana and Tai'z. None of the strikes in these two cases caused significant damage or casualties or affected the fighting significantly.

ORGANIZED CRIMINAL GROUPS

The potential for international organized criminal groups to obtain, use, or sell NBC weapons has grown in the last few years. In the wake of the Cold War, some of these groups have emerged as a growing threat to U.S. interests. This situation is particularly critical in the former Soviet Union.

A careful distinction must be made, however, between material the criminal groups claim to offer for sale and what they can deliver. For example, numerous criminal elements throughout Europe have been implicated in scams involving the sale of what was advertised as weapons grade nuclear materials. To date, those materials seized by law enforcement officials have been well below enrichment or quantity levels suitable for weapons. Most appear to have come from research facilities rather than from weapons-related facilities.



There are numerous ongoing insurgencies, separatist movements, and civil wars worldwide as shown in the shaded areas. The greatest danger would be from the split up of government forces where an opposing group might gain access to NBC weapons or missiles.

Over the past several years, organized criminal groups and smugglers have become increasingly involved in trafficking illegal nuclear materials. The growing number and sophistication of groups attempting to acquire these materials or weapons is an increasingly crucial concern for international law enforcement.

Beginning in 1991, multiple incidents involving criminal activity and the theft of nuclear material surfaced in Europe. During a 1994 appearance before the Permanent Subcommittee on Investigations, the head of the German Federal Criminal Police (the Federal Bureau of Investigation's German counterpart) offered his insight into criminal trafficking of nuclear material. He reported that the number of incidents involving nuclear materials within Germany was increasing over time: from 41 in 1991, to 158 in 1992, to 241 in 1993, and to 267 in 1994. In late 1994, responding to the incidents involving nuclear material smuggled into Germany in August 1994, Moscow and Bonn agreed to new bilateral security measures.

IMPLICATIONS FOR REGIONAL SECURITY

Controlling or containing proliferation involving transnational groups is particularly difficult because these groups evade or defy recognized

export controls or nonproliferation regimes. Should these groups acquire NBC weapons or missiles, they may be more inclined to employ them in order to achieve their goals than would a member in good standing of the international community of nations. Countering the transfer of these weapons and related technologies to or from these groups has become increasingly difficult. Furthermore, the sophistication of some of the groups — especially organized crime — involved in the smuggling of NBC-related materials has complicated the related problems of locating stolen materials and disabling weapons. In some cases, the difficulty is further complicated by the dual-use nature and availability of the raw materials associated with biological or chemical agents.

Of the transnational groups discussed above, the greatest dangers to U.S. interests stem from terrorists and, to a lesser extent, organized criminal groups. One of the most volatile and frightening scenarios for U.S. defense planning posits a terrorist group, whose actions are directed principally against the United States, with nuclear material or an actual NBC weapon. Though direct U.S. interests are always exposed to some risks, it is unlikely that attacks from insurgents or opposing sides in a civil war that involved such weapons would focus their main attacks on U.S. interests specifically.

Section II

Department of Defense Response

DEPARTMENT OF DEFENSE RESPONSE

INTRODUCTION

The proliferation of weapons of mass destruction provokes regional instability and challenges to the interests of the United States. The United States is an international leader in developing and sustaining global norms against the proliferation of these weapons and missiles. The United States is actively engaged in dialogues with several states in regions around the world to persuade them not to acquire these capabilities or to eliminate capabilities they might have already developed. The United States also is working with states to combat proliferation by assisting them in gaining and assuring greater control over their dual-use equipment and technology. States that gain weapons of mass destruction are able to pose a significant military threat to the interests of the United States, our allies, and friends. The Department of Defense actively contributes to overall U.S. efforts to stem proliferation wherever it occurs and from whatever source, including through active and passive defenses, and maintaining the credibility of our security commitments against military threats, including from adversaries armed with nuclear, biological, or chemical weapons and the missiles to carry them. This section outlines the steps the Department is taking to respond to the challenge of proliferation, and DoD measures to respond to the military threats states pose with their NBC weapons, in support of overall U.S. government efforts to respond to this challenge.

Informed by lessons learned (and some unpleasant surprises) from the Gulf War against Iraq and by the systematic Bottom-Up Review that identified post-Cold War military requirements, DoD has developed the Defense Counterproliferation Initiative. As part of this initiative, the Secretary of Defense has directed that the Joint Chiefs of Staff (JCS), the operational Commanders in Chief (CINCs) responsible for the planning and conduct of military operations, and the military departments and their uniformed services give greater emphasis to counterproliferation requirements and considerations.

Specific objectives of the Defense Counterproliferation Initiative are to: (1) prevent the acquisition of NBC weapons and their delivery systems, (2) roll back proliferation where it has occurred, (3) deter the use of NBC weapons and their delivery systems, and (4) adapt U.S. military forces and planning to respond to regional contingencies in which U.S., allied, and coalition forces face NBC threats. The ordering of objectives is deliberate. In line with national policy, proliferation prevention is the top priority.

To achieve these objectives, the Department of Defense has requested \$165.2 million in FY 1996 for counterproliferation. This effort would fund specific high priority acquisition activities to provide required military capabilities. DoD will also use these funds to modify and adapt other programs (totalling \$3.8 billion) that are strongly related to the counterproliferation mission.

The Defense Department plays a role in support of all facets of national counterproliferation policy. This overview begins with proliferation protection, for which DoD has unique responsibilities, and then reviews contributions to proliferation prevention.

PROTECTION

Overview

One of the core objectives in proliferation protection policy is to convince potential and actual proliferants that NBC weapons will be of no value because the United States and its coalition partners will have the capability to deny or limit the political and military utility of NBC weapons, and because the damage inflicted by U.S. and coalition forces in response will far outweigh any potential benefits of use.

There is no simple solution or single response to the threat posed by the proliferation of NBC weapons and their delivery systems. As is essential with all new initiatives, the right balance has to be struck between thorough, step-by-step planning and early action to remedy long identified shortfalls. A comprehensive review of the military missions and functions related to counterproliferation has been

completed to ensure that all aspects of the issue are assessed. DoD assessments have been coordinated with congressionally mandated national reviews. Several acquisition programs already in the pipeline have been augmented to remedy identified shortfalls. Proliferation protection measures can be grouped into five areas of emphasis: policy, military planning and operations, acquisition, intelligence, and international cooperation initiatives. While much work is yet to be done to acquire the required capabilities, there have been significant achievements to date.

Policy

President Clinton's September 1993 policy statement to the United Nations General Assembly established the groundwork for building a new consensus within the United States and with our friends and allies abroad concerning counterproliferation objectives.

Early in his Administration, President Clinton issued guidance defining national nonproliferation policy objectives. Responding to this guidance, the Secretary of Defense issued DoD implementation instructions. Counterproliferation objectives and capabilities are now routinely addressed in the Department's planning and programming processes, with prominent emphasis in the Defense Planning Guidance. Military planning, training, and exercises now give much more emphasis to proliferation when potential major regional contingencies are addressed.

The underlying objective of the Defense Counterproliferation Initiative is to make counterproliferation one of the matters that is routinely given consideration within the Department's activities. Counterproliferation is not of a unique nature requiring a stand-alone organizational structure. Rather, counterproliferation considerations have ramifications for virtually every aspect of the defense mission in this new security era and, therefore, should be embedded in the day-to-day operations. Secretary Perry has directed the establishment of a DoD Directive to fully reinforce implementation of counterproliferation policy. The Assistant Secretary of Defense for International Security Policy has been assigned responsibility for

the development and implementation of DoD's counterproliferation policy.

Proliferation protection is based on the enhancement and utilization of existing resources. Proliferation protection requires a broad range of capabilities, including effective strategic and tactical intelligence; battlefield surveillance; counterforce; active defense; passive defense; and response to paramilitary, covert, and terrorist threats.

Military Planning and Operations

One of the objectives of the DoD Counterproliferation Initiative is to integrate proliferation concerns into the existing DoD defense planning process. At the request of the Deputy Secretary of Defense, the Chairman of the Joint Chiefs of Staff (CJCS) conducted a review of the missions of the CINCs and functions of the armed services in support of the counterproliferation policy. To guide his study, the CJCS issued terms of reference for counterproliferation activities to combatant commanders that cover situations where the military might be called upon to support U.S. policy. The study addressed how the Services organize, train, and equip their forces to support the counterproliferation policy and the missions, responsibilities, and force structure of each combatant command.

The final report of the Missions and Functions Study was approved by the Secretary of Defense on May 5, 1995. It recommended that counterproliferation be assigned to the U.S. armed forces as a military mission. On May 24, 1995, the President subsequently revised the Unified Command Plan to reflect this decision. The mission to counter the proliferation of NBC weapons was assigned to those combatant commanders (CINCs) most directly responsible for carrying out the defense of U.S. national interests overseas where proliferation occurs and its immediate impact is felt — namely, the CINCs with geographic areas of responsibility. The assignment of counterproliferation as a definitive military mission will result in optimized organizational arrangements between supported and supporting CINCs, development of counterproliferation-specific operational concepts, and tailored relationships between the CINCs and the U.S. Intelligence Community and other government agencies that will improve U.S. forces' ability to operate and prevail against an NBC-armed adversary.

The CINCs, Services, and Joint Staff are already engaged in planning activities to support the overall U.S. government effort against NBC threats. The Joint Warfighting Capabilities Assessment (JWCA) was commissioned by the CJCS to evaluate the overall U.S. military effort to respond to the challenges of the new global security environment. The CJCS designated counterproliferation as one of the nine central Joint Warfighting Capabilities to be addressed in this ongoing series of assessments. Working from national goals identified in the President's National Security Strategy, the JWCA translates these national goals into military objectives and requirements, and then identifies the military capabilities and programs necessary to meet those requirements.

The key to effective planning for the operational challenges posed by proliferation is a detailed analytical understanding of this new security challenge and its implications for current U.S. strategy. Based on this analysis, the Department is determining initiatives that optimize solutions to the complex and myriad challenges posed by a future adversary's use or threatened use of NBC weapons.

Joint Staff planners have been working with the CINCs to refine counterproliferation priorities and required enhancements to U.S. military capabilities for all warfighting missions. As a result, the CINCs have developed a list of required capabilities to meet the NBC proliferation threat. The CINCs place highest priority on those missions where the most leverage could be exercised in a short time by fielding quickly enhanced capabilities. This is in line with their responsibility to be prepared to employ their forces for deterrence and defense, immediately.

The CINCs' number one priority for enhancing their counterproliferation capabilities is improved equipment to detect and characterize chemical weapons (CW) and biological weapons (BW) threats, particularly at long ranges. The wide variety of chemical and biological agents calls for a variety of protective measures. Detection and characterization is one element of passive defense. Thus, the ability to detect, range, and track CW and BW clouds, particularly at long ranges, provides additional early warning time for units at risk of attack.

The next CINC priority is the ability to intercept cruise missiles. Emphasis continues to be placed on ballistic missile intercept, but the widening availability of cruise missile technology (particularly the development and potential proliferation of low-observable cruise missile technology) requires military planners to prepare for this emerging challenge. For counterproliferation, these intercept capabilities are termed active defenses. These capabilities are particularly relevant for counterproliferation because cruise missiles are an extremely effective delivery system for BW and certain CW attacks.

Improved capabilities for the identification, characterization, and defeat of underground targets are the next set of CINC priorities. Proliferants are increasingly making use of underground facilities as they respond to the demonstrated effectiveness in the Gulf War of U.S. precision conventional munitions. For counterproliferation, the capabilities to address these targets are termed counterforce. Further discussion of this issue can be found in the Acquisition (Counterforce) portion of this section. Similarly, CINC-designated requirements concerning improvements in intelligence capabilities are addressed in the Intelligence and Acquisition (Counterforce/Battlefield Surveillance) sections.

The regional commanders have identified additional requirements for improved passive defense capabilities to operate successfully in NBC environments. Biological vaccines are one example. One of the key ingredients to dissuading proliferators from acquiring or using these weapons is eliminating the value of NBC weapons and the delivery systems to the proliferant. Passive defenses that allow sustained combat and logistical operations in the face of attacks by NBC weapons and their delivery systems are among the best ways to accomplish this.

Disabling above-ground NBC infrastructure, both production capabilities as well as weapons in storage and on delivery systems, is a CINC priority that poses some unique challenges. Collateral effects, e.g., the dispersal of nuclear, CW, or BW material following an attack, are of concern. Improved capabilities for prediction and minimization of collateral effects are required. A related priority involves new munitions for biological and chemical agent defeat. It may do little good to destroy an incoming missile if the CW or BW agent

is released anyway, perhaps over U.S. or coalition forces.

Other items on the CINCs' priority list being pursued and discussed later in this section include improvements in capabilities for the detection and tracking of NBC shipments; prompt mobile target kill; support for Special Operations Forces; and the ability to locate, detect, and disarm NBC weapons in the United States and overseas.

Acquisition

The CINCs, working through the JCS, identify their requirements for passive defense, active defense, counterforce, and capabilities against covert/paramilitary threats. The DoD acquisition strategy accelerates programs to meet these requirements, redressing shortfalls and funding research and development (R&D) to provide capabilities that cannot be met with current systems and technologies. The JWCA Counterproliferation Team is a mechanism for providing linkage between regional commanders' requirements and the Department's R&D investment programs.

To provide focus for the Defense acquisition strategy, the Assistant to the Secretary of Defense for Atomic Energy has been designated as the lead for counterproliferation programs within the Office of the Secretary of Defense (OSD). The same official serves as the oversight authority for chemical/biological defense programs.

At the direction of Congress, a Non-Proliferation Program Review Committee (NPRC) was constituted in 1994. In its May 1994 report to Congress, the primary volume of which has been made available to the public, this committee identified key areas in which progress was needed to improve government-wide capabilities for proliferation prevention and protection. DoD established the Counterproliferation Support Program specifically to address the DoD shortfalls in operational capabilities identified by the NPRC. Congress provided the Counterproliferation Support Program with \$60 million in FY 1995 to jump-start the program, and \$108.2 million has been requested by the Administration in FY 1996 to accelerate the development and deployment of essential military counterproliferation technologies and capabilities. In addition, \$57 million was added to the existing cruise missile

defense programs (in the FY 1996 President's Budget Submission), bringing the total DoD enhancement for FY 1996 to \$165.2 million. These funds assist the Department in addressing specific counterproliferation priorities in tandem with the existing DoD-wide FY 1996 investment of approximately \$3.8 billion in programs related to countering proliferation (of which \$2.4 billion is research, development, test and engineering (RDT&E) funding to provide an active defense capability).

A follow-on Counterproliferation Program Review Committee (CPRC) comprised of the Secretary of Defense (chairman), Secretary of Energy, Director of Central Intelligence (DCI), and Chairman of the Joint Chiefs of Staff was constituted by Congress to provide status reports on activities to accomplish improvements identified by the NPRC. The result is a coordinated national investment strategy for counterproliferation. Details are contained in the *Counterproliferation Program Review Committee Report on Activities and Programs for Countering Proliferation*, May 1995. Again, in the interest of informing the public, most of this committee's product has been released for general distribution.

The Department is focusing its investments in military systems to support counterproliferation in four areas: passive defense; active defense; counterforce; and measures to counter paramilitary, covert, and terrorist NBC threats.

It should be noted that the programs outlined below represent proposed, new, and ongoing DoD projects and new initiatives strongly related to countering proliferation. General purpose and defense infrastructure programs, such as the development and procurement programs for the various military weapon delivery platforms, are not included because they contribute to the basic capabilities of U.S. forces as well as capabilities for countering proliferation. Most of the new investments leverage existing and other in-development capabilities.

PASSIVE DEFENSE

In response to congressional direction, the Defense Department has established an integrated Chemical-Biological Defense (CBD) program under the oversight of the Assistant to the Secretary of Defense for Atomic Energy. The same official has oversight responsibility for the Joint Program Office for Biological Defense created to provide

management oversight for critical BW defense acquisition programs, including BW vaccine production and BW agent battlefield detection programs. The Counterproliferation Support Program leverages existing programs to accelerate the fielding of critical systems and technologies.

Passive defense involves military capabilities that provide protection against NBC weapon effects. Passive defense programs involve contamination avoidance (reconnaissance, detection, and warning), force protection (individual and collective protection and medical support), and decontamination.

Within the contamination avoidance area, sensors for joint task forces, mobile BW/CW reconnaissance, and systems capable of detecting multiple BW/CW agents and characterizing new agents are being developed. Technological advances are being pursued in remote detection, miniaturization, lower detection limits, logistics supportability, and biological detection capability.

In the force protection area, improved mask systems and advanced protective clothing are being developed under a joint program that will reduce the weight, heat stress, and logistics burden of current gear. Medical research is providing improved prophylaxes, antidotes, treatments, vaccines, and medical casualty management systems. Lightweight BW/CW protective shelters and integrated collective protection technology advances are also supported.

For decontamination, modular systems are being developed. Technology development programs to examine advances in sorbents, coatings catalysis, and physical removal are supported. The CBD program also includes projects to protect U.S. forces from nuclear and radiological weapons effects, including detection and warning sensors, individual and collective protection, medical response, and decontamination. The total RDT&E and procurement budget for the CBD program in FY 1996 is about \$350 million.

As a counterpart to these activities, the Counterproliferation Support Program leverages existing programs to accelerate the deployment of important systems. Specifically, the program is supporting projects to: (1) accelerate (by up to six years) the

fielding of an advanced long-range eye-safe infrared lidar (laser detection device) to provide long-range battlefield warning of CW/BW use; (2) explore whether ultraviolet multifrequency lasers can be employed to detect and characterize biological agents by their fluorescent spectra; (3) develop miniaturized BW/CW point detectors with increased sensitivity that are amenable to installation on unmanned aerial vehicles; (4) accelerate (by two years) the procurement of improved individual protective clothing and collective protective equipment; (5) supplement the CBD decontamination technology base; and (6) enhance existing joint NBC doctrine and training procedures by intensified battlefield simulation. Approximately \$30 million has been budgeted in FY 1996 for these passive defense elements of the Counterproliferation Support Program.

The Defense Nuclear Agency (DNA) and the military departments also manage a number of passive defense programs. DNA has programs to ensure the survivability of weapons systems in a nuclear environment; \$95.5 million has been budgeted for these investments in FY 1996. The Navy's Radiological Controls program provides RDT&E of radiation monitoring equipment for Navy and Marine Corps use. The Army's programs include the operation of Dugway Proving Ground, Utah, as the primary test range for biological and chemical defense equipment and the Nuclear Effects Survivability program, which develops technology to enhance the survivability of Army systems in nuclear environments. Additional details may be found in the May 1995 Counterproliferation Program Review Committee Report.

ACTIVE DEFENSE

This facet of counterproliferation involves programs that improve capabilities to detect, track, identify, intercept and destroy, and neutralize NBC warheads delivered by airborne launch platforms, ballistic missiles, and cruise missiles, while minimizing collateral effects.

To address the security challenges posed by the proliferation of NBC weapons and the ballistic missiles used to deliver them, DoD is continuing to implement the new priorities established for ballistic missile defense identified in the Department-wide Bottom-Up Review. These new priorities respond to the end of the Cold War. They focus

on requirements to prepare for major regional contingencies that may involve adversaries with NBC weapons.

The threat of the use of ballistic missiles has grown enormously over the past two decades. Ballistic missiles have been used in six regional conflicts since 1973. During the Gulf War, the United States and its Coalition partners were unable to locate Iraq's mobile launchers and halt ballistic missile attacks. Ballistic missiles — coupled with NBC weapons — will pose an even greater threat to U.S. security and that of allies and other friendly nations. To effectively counter such threats, a layered defense is optimal, with effort being made to attack prior, at, or immediately after launch so that NBC warhead debris and contamination do not land on friendly territory or troops. While engagement prior to launch is optimal, it may be more practical in some situations to engage missiles after they are launched. The Ballistic Missile Defense Organization (BMDO) has the lead in this technology and acquisition effort.

To achieve active defense against missiles armed with NBC warheads in a theater conflict, DoD has developed a theater missile defense (TMD) architecture that will entail deployment of multilayered defenses. These layers consist of a lower tier including Patriot Advanced Capability-3 (PAC-3), Navy area TMD, and Corps Surface-to-Air Missile/Medium Extended Air Defense System (SAM/MEADS), and an upper tier comprising Theater High Altitude Area Defense (THAAD) and Navy wide-area TMD; and boost phase intercept.

The technologies necessary to destroy enemy ballistic missiles during boost phase soon after launch are still being developed. Additional efforts are aimed at gaining a better understanding of the dispersion of BW/CW agents in flight and methods for neutralizing them to reduce collateral effects associated with ballistic and cruise missile engagements.

BMDO is currently conducting several TMD programs including: (1) boost phase intercept; (2) demonstration, validation, and engineering manufacturing development for various TMD concepts including Patriot PAC-3, THAAD, the Navy Upper Tier and Lower Tier Systems and Corps SAM/MEADS; (3) advanced sensor technology and

innovative science and technology RDT&E programs for post-2000 defense systems; (4) threat and countermeasures projects that define adversary military systems to ensure a robust defense system; and (5) assessment, modeling, and experimental activities involving collateral effects release associated with attacking cruise and ballistic missiles armed with NBC weapons. BMDO has budgeted approximately \$2.4 billion in FY 1996 to support these programs.

BMDO active defense programs are supplemented by a number of Defense Advanced Research Projects Agency (DARPA), Navy, and Air Force programs. In its air defense initiative, DARPA is developing the Mountain Top radar for defense against manned aircraft, cruise missiles, and theater ballistic missiles; \$45.6 million has been budgeted for the program in FY 1996. BMDO and the Navy will also provide FY 1996 funding for the Mountain Top ACTD (Advanced Concept Technology Demonstration). DARPA's Enhanced Program for Cruise Missile Defense will provide additional sensor platforms and fire control capabilities to accelerate its overall air defense initiative; \$57 million has been budgeted for this program in FY 1996.

The Air Force is managing three programs in this area: the Theater Missile Defense program, the Airborne Laser (ABL) program, and the Space Sensor and Satellite Communication Technology program. The Air Force will field one ABL prototype with a contingency capability in 2001. The ABL destroys theater ballistic missiles in the boost phase, causing debris to fall on enemy territory, and it also provides a rapidly deployable wide-area defense capability. Approximately \$47 million has been budgeted for these activities in FY 1996.

COUNTERFORCE

This component of counterproliferation involves development of military capabilities to target (using battlefield surveillance and other intelligence assets), plan attacks, seize, disable, destroy, disrupt, interdict, neutralize, or deny the use of NBC weapons and launch platforms and their supporting command, control, and communications (C³); logistics structure; and reconnaissance, surveillance, and target acquisition platforms while minimizing collateral effects. Attack operations include action by air, land, sea, space, and special operations forces.

In the counterforce area, DoD is working to improve capabilities to defeat NBC threats before they can be used against U.S., allied, and coalition forces and noncombatants. U.S. forces must be capable of a rapid and effective response to contingencies throughout the world. Resources are being applied to improving capabilities for battlefield surveillance, target characterization, and munition/agent defeat.

For battlefield surveillance, DoD is improving capabilities to detect, identify, and characterize NBC forces and associated infrastructure elements in a timely manner to support targeting, mission/strike planning, and post-strike battle damage assessments (BDA). Emphasis is being placed on continuous wide-area surveillance; detection of mobile targets (particularly NBC-armed mobile missile launchers) and improved BDA capabilities. DoD is also enhancing capabilities for the integration and analysis of sensor inputs. These capabilities are required to provide the data needed to support attacks in the often very limited time windows available before mobile targets move from previously identified locations. As the Gulf War demonstrated, this is an extremely challenging problem. We were not successful in attempts to detect and destroy mobile SCUD-class theater ballistic missiles prior to launch. Such missions require the orchestration of inputs from sensors in near real-time and the prompt response of weapon systems capable of defeating these targets.

Target characterization — accurate information concerning the locations and characteristics of NBC related facilities — is required for counterforce operations. The detection and characterization of hardened underground NBC facilities are particularly vital given the challenges of defeating these targets. An underground location does not preclude a facility from being located, characterized, and defeated. The warfighter needs intelligence information that characterizes the NBC facility, ideally to the level of resolution needed to direct precision munitions against the most critical elements within it. This information needs to be supplemented with modeling tools that can assist in target characterization and selecting the most effective weapon.

To make effective use of this target information, our forces must have weapons that are capable of penetrating through walls and other barriers that

provide protection for above- and below-ground structures. They must also have munitions that can defeat the NBC targets engaged. For biological and chemical weapon targets, new types of agent defeat munitions are needed. These systems must be able to perform their missions in scenarios in which NBC targets are protected by air defenses and (in the future) missile defenses. Concurrently, there is a requirement for a new system for the prediction of the collateral hazards that might result from attacks on NBC targets. The collateral effects induced by damage to the chemical or biological weapon targets may be far more significant than the direct and collateral effects induced by the munitions used in the attack.

The Counterproliferation Support Program is supporting several specific projects in the counterforce area. The investments focus on sensors, collateral effects mitigation, weapon effects and target response, advanced weapons and warheads, munitions for neutralization of chemical and biological agents, concepts for defeat of tunnels, and a Counterproliferation ACTD.

Priorities for new sensors to support counterforce operations include tactical Unattended Ground Sensors (UGS) and airborne forward looking infrared radar for target surveillance, characterization, battle damage assessment and collateral effects monitoring, and developing a weapon-borne sensor to enhance underground target bomb damage assessment; \$9.3 million has been budgeted in FY 1996 for these programs as part of the Sensor Technology Project.

Improving our understanding of collateral effects release phenomenology and transport is a priority for counterforce attacks against NBC targets. Approximately \$8.9 million has been budgeted in FY 1996 for source term characterization and transport prediction, phenomenology experiments, and assessment tools.

Improving the state of knowledge in weapons effects and target vulnerability/response is required to ensure that counterforce operations are effective. Over \$9 million has been budgeted in FY 1996 for experimental and analytical assessment of NBC target vulnerability response and automated target planning for NBC targets/proliferation path assessments to assist in target identification and strike planning.

Developing advanced penetrating weapons and advanced warheads/payloads for enhanced lethality and functional kill against hard underground targets is required because some proliferants have opted to locate their NBC capabilities in underground or otherwise hard-to-defeat locations and facilities. In FY 1996, \$14.3 million has been budgeted to develop an enhanced penetrating munition to defeat underground targets. It will be compatible with most tactical delivery platforms and have all-weather, anti-jam precision guidance capability. Additionally, \$3.5 million has been budgeted in FY 1996 for development of a high temperature incendiary weapon payload and a classified payload.

Concern regarding collateral effects has prompted efforts to develop new types of biological and chemical agent neutralization weapons. Approximately \$4 million has been budgeted in FY 1996 for development of prototype agent defeat munitions.

We are also emphasizing tunnel defeat concepts, target response, and vulnerability assessment because some proliferants have opted to make use of these very difficult-to-defeat facilities. Approximately \$9.9 million has been budgeted in FY 1996 to assess tunnel response and vulnerability.

ACTDs are a new approach to acquisition. They rapidly integrate and demonstrate new military applications of current technologies. They are performed for a warfighting command customer and provide (following demonstration) a small quantity of new prototype systems. Responding to a CINC priority, a Counterproliferation ACTD is being conducted to integrate advanced sensors, mission planning tools, collateral effects prediction capability, and enhanced conventional weapons. The ACTD is designed to support rapid fielding of these new capabilities; \$2.7 million has been budgeted for this program in FY 1996.

These new DoD counterforce initiatives are supplemented by current DARPA and DNA programs. The DARPA "Warbreaker" or Critical Mobile Targets Project is focusing on Distributed Interactive Simulation to support R&D activities associated with sensor systems, communication sites, and information processing systems to detect, identify, and prosecute high value, time-critical fixed and mobile targets such as theater ballistic

missiles, tanks, and artillery; \$135 million has been budgeted for this project in FY 1996. DNA's weapon system lethality program is developing lethality criteria for a full spectrum of weapons, including precision guided munitions and advanced conventional and unconventional payloads. The target base includes hard and superhard underground facilities, fixed surface facilities, and sea-based structures; \$46 million has been budgeted for this project in FY 1996.

MEASURES TO COUNTER PARAMILITARY, COVERT, AND TERRORIST THREATS

Acquisition investments in this category are intended to protect military and civilian personnel, facilities, and logistical/mobilization nodes from this special class of NBC threats, both in the United States and overseas. This category of threat is increasing. Particularly challenging is the threat of covertly emplaced NBC weapons. The chemical weapon attack on the Tokyo subway by Japanese terrorists is a grim example. DoD is actively pursuing several activities to counter paramilitary, covert delivery, and terrorist NBC threats and protect military facilities and logistical/mobilization nodes against these threats. These include supporting, training, and equipping Joint Special Operations Forces, Explosive Ordnance Disposal (EOD) teams, and NBC weapon response teams to detect, neutralize, and render safe NBC devices both in the United States and overseas. These DoD capabilities can be provided to assist appropriate U.S. government authorities in countering these threats, operating within the parameters provided by law and regulation; the Defense Department is not a domestic police agency.

DoD is devoting significant resources to developing the necessary technical means to counter NBC paramilitary, covert delivery, and terrorist threats. Much effort is underway in tactical intelligence and related programs to conduct counterproliferation missions. Other programs include development of special warfare and C³ equipment, airbase protection programs, Nuclear Emergency Search Team (NEST) support activities, multi-Service EOD teams, and RDT&E of advanced technologies to support the U.S. Special Operations Command and EOD operations. Just over \$12 million has been budgeted for these programs in FY 1996.

New DoD initiatives to counter paramilitary/covert and terrorist NBC threats are being supported by the Counterproliferation Support Program. These efforts are focused on developing an effective response to chemical and biological threats through development of BW/CW emergency response teams modeled on Department of Energy's NEST. Projects underway include evaluation of military facility NBC defense and developing enabling technologies and equipment to support and fund joint training exercises to improve readiness of NBC response teams. Just under \$5 million has been budgeted for these projects in FY 1996. The Department of Energy national laboratories are also contributing to these projects, including work with DNA's Nuclear Incident Program to improve military base and mobilization/logistical node defense against nuclear threats.

Finally, the Navy's Joint Service Explosive Ordinance Disposal Systems program develops specialized EOD equipment and tools required for detecting, locating, and rendering safe NBC munitions. The Navy has budgeted about \$4.8 million for this program in FY 1996.

Intelligence

Effective intelligence support is critical to all aspects of the DoD counterproliferation effort. To assist Department officials in taking advantage of proliferation prevention and protection opportunities, the Intelligence Community must provide accurate and timely intelligence assessments on the motivations and plans of leaders in states that may elect to develop NBC weapon capabilities, the clandestine procurement networks used by these states, the status of their NBC weapon programs, and locations of both weapon production capabilities and deployed weapons. Information on NBC weapon-related intentions, capabilities, and activities of transnational groups, such as ethnic or regional movements, terrorists groups, or organized criminal elements, also is needed. This is a demanding set of requirements. The dual-use nature of many technologies involved in NBC and delivery systems development complicate these tasks.

The Intelligence Community has taken steps to improve the management and coordination of intel-

ligence support to DoD customers. As part of this effort, additional DoD personnel — including the addition of a military deputy — have been assigned to the DCI's Nonproliferation Center (NPC) — the Intelligence Community body that orchestrates intelligence activities related to proliferation. NPC and the Intelligence Community have instituted a new strategic planning, resource guidance, and evaluation process that better serves overall counterproliferation efforts. The Defense Intelligence Agency (DIA), however, remains the prime conduit for national-level intelligence support to the Defense Department. To better focus its intelligence support to counterproliferation, it created an Office for Counterproliferation and Nuclear, Biological, and Chemical Assessments.

As the threat from proliferants has increased, the Intelligence Community has provided timely information in support of diplomatic, law enforcement, and military efforts to prevent proliferation. The successes of these efforts range from providing actionable intelligence to decisionmakers so they can attempt to stop specific activities to supporting the development of U.S. strategies to deal with proliferators.

Moreover, intelligence programs provide the critical input to the challenges for military planning and operations — chemical and biological agent detection, characterization of underground activities, information on weapon design to facilitate disabling activities, locating and identifying mobile targets, and calculating weapons effects. In addition, increasingly accurate U.S. weapons require even more fine-grained intelligence information on proliferants' facilities and weapons effects.

Particular emphasis has been given to providing increased warning time before potential adversaries translate technological potential for proliferation into operational NBC weapon capabilities. U.S. acquisition — and even training and doctrine — lead times do not permit the luxury of a "wait and see" approach. With lead times for new U.S. capabilities sometimes as long as five to ten years, DoD needs to be able to anticipate the threats that might be faced in future regional contingencies through early analysis of a proliferant's NBC weapons efforts. To meet this requirement, the Intelligence Community has established new working arrangements with the technical expertise of the Department of Energy and its national labs.

This has expanded from a primarily nuclear focus to include chemical and biological weapon threat detection, characterization, and analysis.

International Cooperation

It is very likely that we will not fight alone on the battlefields of the future. Future conflicts are likely to involve coalition operations, as was the case in the Gulf War. Building and maintaining coalitions in such conflicts will be one of the keys to successful military operations. The ability to protect our populations, territory, and forces, and those of our friends and allies, therefore, becomes a paramount consideration in building and maintaining coalitions, as well as succeeding in military operations. As a result, the Defense Counterproliferation Initiative places great emphasis on international cooperation in preparation for future crises or conflicts where the threat or use of NBC weapons may be present.

DoD has been working with America's long-time allies in Europe and Asia to develop a common approach to counterproliferation. Following President Clinton's emphasis at the January 1994 NATO Summit on the danger to Alliance members from NBC proliferation, significant progress has been made in integrating counterproliferation policy into the new, post-Cold War agenda of the Alliance.

At the summit, NATO Heads of State directed that the Alliance intensify and expand its political and defense efforts against proliferation. Three groups were subsequently created: the Joint Committee on Proliferation (JCP), which monitors overall Alliance efforts; the Senior Politico-Military Group on Proliferation (SGP), which focuses on how NATO can reinforce traditional nonproliferation efforts; and the Senior Defense Group on Proliferation (DGP), which examines the defense aspects of proliferation, including the military capabilities needed to discourage NBC proliferation, deter NBC weapons use, and if necessary, to protect NATO territory, populations, and forces.

In May 1994, NATO approved two milestone documents: a political framework paper structuring the broad political-military approach of the Alliance to proliferation, and a three-phase workplan for the DGP to address the defense impli-

cations of proliferation. The DGP is co-chaired by the United States and one of the European Allies on a rotating basis. France provided the first European co-chair. Having assessed the risks posed by the proliferation of NBC weapons to the Alliance, the DGP has begun the next phase of its work, in which it is grappling with the operational implications of the threat or use of NBC weapons for Alliance military capabilities. In this task, NATO is building on the relevant capabilities of the national militaries and the ongoing work of NATO planning groups. NATO is working to establish a framework for defense activities related to proliferation and to reach conclusions on the full spectrum of Alliance and national capabilities needed to deal with the range of proliferation threats.

The DGP's work is an important part of the Alliance's continuing adaptation to the new security environment. NATO shows that the United States is not alone in its concern for the defense dimension of proliferation. Today, the Alliance sees dealing with proliferation as one of its key missions. This demonstrates that the Alliance remains committed — indeed, well-qualified — to address emerging security concerns. It also provides a tangible example of the continued interest of the European allies in cooperative transatlantic security with the United States.

The Government of Japan has also recognized the growing danger from attacks with missiles, including those armed with NBC warheads, the need to strengthen the defensive capabilities of U.S. and Japanese forces, and the necessity of maintaining capabilities for combined joint operations. To meet this threat, the United States and Japan are working to identify the theater missile defense capability Japan will need and to evaluate options for acquiring that capability in future years, including opportunities for cooperative programs.

DoD is currently beginning other cooperative efforts with allies. A defense science symposium involving participants from the United States, United Kingdom, Canada, and Australia was conducted in the United States in March 1995. This symposium focused on counterproliferation technology applications and on the identification of opportunities for collaborative research and development to enhance counterproliferation capabilities. The United States, Canada, and the United Kingdom have initiated a cooperative R&D

program to improve capabilities for detecting, characterizing, and providing protection against biological and chemical agents based on lessons learned during the Gulf War.

PREVENTION

Overview

Proliferation prevention is the United States' primary objective. DoD contributions to proliferation prevention are part of a coordinated national effort involving multiple departments and agencies, allied states, and international organizations. Defense Department support includes the Nunn-Lugar Cooperative Threat Reduction (CTR) program, export control activities and DoD inspection, verification, and enforcement support for the treaties and arms control regimes that limit NBC weapons and associated delivery systems. The Defense Department also plays an important role in the four thrusts involved in proliferation prevention — denial, reassurance, dissuasion, and actions to reverse proliferation.

International norms and standards make an important contribution to proliferation prevention. In addition to creating an atmosphere of restraint, they may provide the preconditions, e.g., inspections, that impede proliferation. These international norms can be specifically agreed to in export control and arms control agreements or they can result from informal arrangements between states.

A great success in the area of norm establishment has been DoD support for the unconditional and indefinite extension of the Non-Proliferation Treaty (NPT). The NPT, which became effective in 1970, establishes obligations for both nuclear weapons and non-nuclear weapons states regarding the transfer, manufacture, or acquisition of nuclear weapons or other nuclear explosive devices. It allows all parties to participate in the fullest possible exchange of equipment, materials, and scientific and technological information for the peaceful uses of nuclear energy while at the same time prohibiting transfer and acquisition of nuclear weapon capabilities.

Cooperative Threat Reduction Program

The CTR program provides the services, tools, and technology required to help the New Independent States (NIS) with the elimination or reduction of weapons of mass destruction and to modernize and expand safeguards against proliferation within the NIS. The program consists currently of nearly 40 separate projects, grouped into three categories, reflecting the objectives established by Congress.

First, Destruction and Dismantlement activities help with the dismantlement and elimination of weapons of mass destruction and their launchers in the four eligible states where they remain (Russia, Belarus, Kazakhstan, and Ukraine). The availability of U.S. assistance encourages these countries to undertake the dismantling of weapons, and then the CTR program provides the actual equipment, services, and training required to implement their dismantlement decisions. Specifically, CTR Dismantlement and Destruction activities are:

- Assisting Ukraine, Belarus, and Kazakhstan in becoming non-nuclear weapons states.
- Assisting Russia in accelerating strategic arms reduction to START levels.
- Initiating and accelerating the destruction of Russian chemical weapons.

Projects in this area assist in the dismantlement or destruction of strategic nuclear missiles, silo launchers, liquid and solid rocket propellants, and Russian chemical weapons. Also included is assistance in the destruction of the launcher tubes in ballistic missile-firing submarines, the elimination of heavy bombers, and the elimination or conversion of the infrastructure (hardware and personnel) that supports these systems.

Second, through chain of custody activities, the CTR program decreases the dangers from the nuclear weapons and fissile materials that remain in the NIS, particularly Russia. During the difficult and uncertain period of transition in these states, the continued secure chain of custody of nuclear weapons and materials is vitally important to both the United States and the NIS. Chain of Custody activities enhance security, safety, and control of nuclear weapons and fissile material in Russia by assisting in centralizing fissile material in a limited number of storage areas and strengthening safety,

security, and control during movement and interim storage. Projects provide assistance to enhance effective controls over nuclear weapons and the fissile materials removed from them throughout the drawdown and dismantlement of these weapons. This includes providing safe and secure transportation of nuclear weapons from operational sites and storage areas to dismantlement facilities; improved security and accountability for weapons in transit; safer and more secure storage and transport of fissile material removed from nuclear weapons by providing storage containers; and designing, equipping, and assisting in construction of centralized fissile material storage facilities.

Finally, CTR supports Demilitarization efforts. CTR Demilitarization activities are encouraging the demilitarization of Ukraine, Belarus, Kazakhstan, and Russia by supporting conversion of NIS defense enterprises, expanding defense military contacts, and reemploying weapons scientists. These activities are decreasing the long-term threat by reducing the capacity and economic pressures in the NIS to continue to produce weapons of mass destruction.

CTR supported defense conversion industrial partnerships help to reduce the potential of a future nuclear threat at its source, as do international science and technology centers the United States and other countries have set up in Moscow and Kiev. Through these centers, former Soviet nuclear scientists and engineers are being reemployed in peaceful, civilian endeavors. These projects reduce the supply of weapons of mass destruction available for foreign sale, the incentives for relying on such sales for income, and provide job alternatives for weapons scientists who might otherwise be tempted to sell their nuclear expertise abroad. The defense conversion investments under CTR are win-win-win — they help reduce the threats from weapons of mass destruction; they help the NIS build peaceful, commercially viable market economies while reducing excess military capacity; and they provide opportunities for U.S. industry's entry into potentially large markets for civilian goods and services.

CTR ACCOMPLISHMENTS

CTR has gone far to reduce the threat of proliferation within and outside the former Soviet Union in the three short years of its existence, and the bulk of the achievements have been in just the past year. The program has facilitated the return to Russia of over 1,700 warheads from Belarus, Kazakhstan, and Ukraine; the removal to secure storage of over 2,800 warheads from missile and bomber bases; the deactivation of four regiments of SS-19 ICBMs in Ukraine; the removal of 750 missiles from their launchers; and the elimination of approximately 630 strategic launchers and 91 bombers throughout the NIS. CTR assistance also helped prompt Ukraine to begin early deactivation and shipment to Russia of SS-19 and SS-24 warheads and to accede to the Nuclear Non-Proliferation Treaty as a non-nuclear weapons state, thereby allowing the Start I treaty to enter into force — a key nonproliferation success.

CTR has contributed to other efforts to prevent proliferation. Over 5,000 former Soviet weapon scientists and engineers once engaged in nuclear weapons research are now or soon will be employed on peaceful, civilian research projects, thus reducing the threat of the transfer of their deadly expertise to potential proliferant states. The Project Sapphire mission in November 1994 to remove 600 kilograms of highly enriched uranium to the United States from Kazakhstan was partially financed with CTR funds.

Denial

Denial involves carefully targeted export controls and the disruption of weapons and technology trade which would assist the potential proliferant in obtaining NBC weapons and delivery systems. U.S. export control policy has two principal objectives. First, we want to stop — or at least retard — the transfer to potential proliferant states of those technologies which could permit them to design, manufacture, or acquire NBC weapons and their delivery systems and other dangerous armaments. Second, we want to monitor flows of dual-use technologies that are acceptable in themselves, but which if diverted or applied to military end uses could have a negative impact on our

national security interests. Some of the key objectives are as presented below:

“Although we recognize that export controls cannot be 100 percent effective in preventing individual transfers, we are convinced that such efforts buy us time to implement other measures to mitigate the impact of these transfers. We believe that a more focused approach of the denial strategy — concentrating on those key enabling technologies that are produced by a limited number of states — will, if applied universally, raise the cost to, and increase the difficulty encountered by, even the most determined proliferant.”

Mitchel B. Wallerstein
Deputy Assistant Secretary of Defense
Presentation to the Conference on Dealing
with the Spread of Nuclear Weapons
The Hague, May 19-20, 1995

DoD's technology security program is designed to prevent the transfer of dangerous and sensitive technologies to countries that pose security threats. When technology is transferred to a country that does not pose a threat, DoD contributes to national efforts to ensure that the transfer is done in a manner that does not endanger U.S. interests or compromise our national security. In addition to controlling transfers of destabilizing conventional weapons and associated dual-use technologies, DoD's technology security program supports the Department's Counterproliferation Initiative.

The Defense Technology Security Administration (DTSA) provides unique military expertise in the processes used to review export applications and serves as the primary DoD agent for executing DoD's portion of the U.S. denial strategy. In order to prioritize export control reviews as they apply to chokepoints, DTSA applies the OSD Critical Technology Support Program, a congressionally mandated mechanism for identifying the most important, militarily relevant technologies. Assistance is provided by the Department of Energy's Office of Energy Intelligence, the Defense Intelligence Agency, the Defense Nuclear Agency, and other DoD components. Defense Department and

other U.S. Intelligence Community organizations actively support the export review process by identifying the key technologies that enable NBC proliferation. Intelligence provides important information on pending or ongoing foreign shipments of critical materials, to include technical assessments of materials and whether they are intended for legitimate civilian use or for military applications.

These analysts also provide critical information on how proliferants acquire technologies and materials through the use of complicated covert procurement networks. Because many of these networks include maritime transport, the Counterproliferation Support Program is directly supporting the deployment this year of the Navy's Specific Emitter Identification (SEI) System to improve DoD's capabilities to identify and track ships at sea suspected of transporting NBC weapons, delivery systems, and NBC related materials. DoD has budgeted approximately \$2.8 million to continue the development of special SEI equipment in FY 1996.

These intelligence capabilities will help the United States maintain and strengthen controls on critical technologies. These controls can have a dramatic effect on slowing the pace of programs and raising their costs. This contribution is important to the ongoing efforts to focus and strengthen key international export control regimes. These capabilities can also be used to support diplomatic demarches and international inspections. Accurate and timely information on a proliferant's activities and intentions can be used to build a global consensus that international norms have been violated.

While DoD shares responsibility for U.S. policy on international regimes with the State Department, Arms Control and Disarmament Agency, and others, the Defense Department provides unique technical and military expertise vital to making these regimes effective. In addition to intelligence support, DoD participates in the negotiation of these regimes, providing valuable operational and technical knowledge.

DoD also plays a leadership role in the implementation of many arms control and nonproliferation regimes. For example, DNA has focused efforts on technologies to assist in verification of arms control agreements; the On-Site Inspection Agency (OSIA) is responsible for implementing inspection and

escort and monitoring requirements under the verification provisions of several U.S. treaties and agreements. A total of \$84.6 million has been budgeted for OSIA inspection support in FY 1996. The primary export control and international non-proliferation regimes are outlined below, with specific DoD contributions highlighted.

***COORDINATING COMMITTEE FOR
MULTILATERAL EXPORT CONTROLS
(COCOM) SUCCESSOR REGIME***

COCOM was a Cold War era export control regime in which the United States and allies restricted the export of technologies to the Soviet Union and other communist countries. DoD has played a central role in negotiations designed to replace COCOM with a new export control regime. The aim is to provide transparency, responsibility, and restraint in the transfer of conventional arms and sensitive dual-use technologies to countries and regions of concern, to include areas where U.S. and allied forces might face hostile military actions. This regime is designed to complement and reinforce other export control regimes. Through cooperation and sharing of information, it will enable the United States and other participating countries to better track and monitor sensitive arms and technology transfers as they occur. Russia and other formerly COCOM proscribed countries have been given incentives, such as greater access to advanced technologies, to join the regime — provided they agree to follow the regime's rules. This parallels other DoD efforts, such as CTR, to address the potential spread of NBC weapons and their delivery systems, advanced conventional weapons, and sensitive dual-use technologies from Russia and other states of the former Soviet Union.

***MISSILE TECHNOLOGY CONTROL REGIME
(MTCR)***

The MTCR is a voluntary arrangement of 28 states including the United States, Canada, Western Europe, Russia, Japan, Australia, New Zealand, Argentina, and Hungary. It controls exports of equipment and technology — both military and dual-use — that are relevant to missile development, production, and operation. DoD provides intelligence and operational expertise for the national-level decisions that are made, on a case-

by-case basis, concerning implementation of this regime's controls.

NUCLEAR SUPPLIERS' GROUP (NSG)

This group, comprising 30 countries, seeks to control exports of nuclear materials, equipment and technology, both nuclear-specific and dual-use. Russia is a member of this group. Other former Soviet Republics — notably Belarus, Ukraine, and Kazakhstan — are not. China and Brazil are among the major potential suppliers of nuclear resources that are not members. The United States' position is that observance of NSG guidelines for nuclear exports by all potential suppliers (irrespective of their decision to join the group) is crucial for controlling the flow of nuclear materials and technologies.

AUSTRALIA GROUP

The Australia Group is an informal arrangement of 29 industrial countries including the United States, Canada, most of Western Europe, Japan, New Zealand, and Australia. It seeks to prevent the spread of chemical and biological weapons material and dual-use technology. The group holds information exchanges and prepares lists of chemical precursors, microorganisms, and related equipment for member countries to control by export licensing and monitoring.

COMPREHENSIVE TEST BAN TREATY (CTBT)

The United States is seeking to conclude negotiations in the Conference on Disarmament on a Comprehensive Test Ban Treaty in 1996. A CTBT will strengthen the global norm against proliferation of nuclear weapons and constrain development of nuclear weapons capability in both proliferant states and acknowledged nuclear weapon states. DoD provides technical expertise in the CTBT negotiations. The Defense Department's Advanced Research Projects Agency has a program to demonstrate the capabilities of seismic and nonseismic monitoring systems for use in verification of a CTBT (approximately \$14 million has been budgeted for FY 1996). The Air Force also has a program, the Nuclear Detonation Detection System, which is aimed at improving capabilities to detect nuclear detonations. Approximately \$16 million has been budgeted in FY 1996 for this program.

BIOLOGICAL WEAPONS CONVENTION (BWC)

The BWC, signed in 1972, prohibits development, production, and stockpiling of biological weapons. The United States is promoting new measures that provide increased transparency of potential biological weapons-related activities and facilities in an effort to help deter violations of and enhance compliance with the Biological Weapons Convention. DoD will participate in the U.S. delegation to the forthcoming BWC Ad Hoc Group negotiations and will play an important role in U.S. efforts to develop off-site and on-site compliance verification measures for consideration by the group. The United States strongly supports the development of a legally binding protocol of such measures to strengthen the BWC.

CHEMICAL WEAPONS CONVENTION (CWC)

The CWC bans the use, development, production, acquisition, stockpiling, and transfer of chemical weapons. Opened for signature on January 13, 1993, as of March 15, 1996, the CWC had 160 signatories and will enter into force 180 days following deposit of the 65th ratification with the United Nations (currently there are 49 ratifications). The CWC Preparatory Commission (PrepCom) is meeting to complete the details necessary to have the Organization for the Prohibition of Chemical Weapons (OPCW) fully operational at entry into force.

DoD has participated actively throughout the PrepCom process, providing expertise on a range of implementation issues such as inspection procedures, data management, and inspector training. Specifically, DNA is accomplishing the CWC Verification Technology Program, which focuses on the technologies required for multinational verification of the CWC. Approximately \$12.6 million has been budgeted for this program in FY 1996.

The nonproliferation regimes discussed above may not be able to prevent proliferation by a determined leadership. Experience suggests that a determined proliferant is likely to succeed. The effectiveness of denial strategy should be determined by the extent to which it frustrates and slows proliferants' efforts, and in the message denial efforts convey regarding our seriousness of purpose. This success is best measured as a function of time — time to improve

regional instabilities that affect the motivations to acquire or develop NBC weapons and their delivery systems, and time to dissuade existing and potential proliferants.

Reassurance and Dissuasion

Denial efforts put time on our side, but time is not enough. Denial must be complemented by regional security dialogue, arms control and confidence building, security assistance, and other forms of reassurance that security needs can be met without resorting to NBC proliferation, and with a vigorous public diplomacy campaign which emphasizes the political, economic, and military costs of proliferation.

Regional instability remains one motivation for proliferation. By reducing regional tensions, we can help reduce the demand for both NBC and advanced conventional weapons. The Organization on Security and Cooperation in Europe (OSCE) and the Middle East Arms Control and Regional Security (ACRS) working group are two regional arms control and confidence building fora that work to broker agreements to reduce regional tensions. The OSCE has provided the framework for the negotiation of several important European security agreements such as the 1990, 1992, and 1994 Vienna Documents and the 1990 Conventional Forces in Europe (CFE) Treaty. The OSCE Forum for Security Cooperation agreed to a Code of Conduct for political-military behavior, a Global Exchange of Military Information, and Nonproliferation Principles at the 1994 OSCE Budapest Summit. Created in 1991 as part of the Madrid Middle East peace process, ACRS is a forum for developing regional confidence building measures. ACRS is one of several multilateral working groups in the Madrid process designed to complement the bilateral peace talks. DoD has played a critical role in supporting these efforts by providing operational and technical expertise to these negotiations.

U.S. Security Assistance programs also can help to defuse regional tensions by enabling friends and allies to acquire conventional equipment, services and training for legitimate self-defense and to support participation in multilateral security efforts, such as coalition warfare. U.S. Security Assistance programs include Foreign Military Sales, International Military Education and Training, and

emergency provision of excess U.S. defense articles. These programs supplement U.S. overseas presence and peacetime engagement by improving the defense capabilities of allies and friends, while demonstrating U.S. commitment to defend common interests.

Alliances and bilateral defense arrangements create a powerful incentive for allies and friends to refrain from the acquisition of NBC weapons. Through the forward deployment of U.S. military forces, the United States provides allies with tangible demonstrations of our commitment to their security, notwithstanding proliferation by other nations in their region. The forward deployment of capable combat forces and periodic demonstrations of our ability to deploy additional forces from the United States, when and as required, may be the Department of Defense's most important contribution to proliferation prevention. These tangible demonstrations of security commitments make it possible for responsible leaderships in allied and friendly nations to conclude that they can rely on U.S. security commitments to provide for their security.

Military-to-military cooperation and contacts also help reassure friends and allies while at the same time dissuading the acquisition of NBC weapons and technology. The extensive U.S. bilateral military-to-military contact program builds trust and promotes professionalism in the armed forces of our friends and allies. These contacts also reinforce basic tenets such as civilian control of the military and the honoring of international norms of behavior.

Regional arms control and confidence building, security assistance and alliance efforts, and military-to-military contacts, however, are only as good as our ability to effectively communicate our intent to proliferants and those threatened by that proliferation. U.S. counterproliferation efforts are part of this public diplomacy campaign. The preparations we undertake through the Defense Counterproliferation Initiative will provide the ability to protect our forces, allies, and future Coalition partners from the consequences of NBC weapons and their delivery systems attack. This initiative is designed to support our public diplomacy campaign by not only convincing proliferants they gain no advantage through NBC weapons and their delivery systems proliferation (at

great expense), but also by helping states resist the temptation to proliferate in response to an adversary's proliferation.

Actions to Reverse Proliferation

Measures to reverse proliferation are the final component of prevention. In some instances, this is involuntary, as in Iraq under UN supervision. In other cases action is self-initiated, as appears to have been the case in South Africa and the non-Russian nuclear weapons states formerly part of the Soviet Union. Available policy instruments here include making available intelligence information concerning the status of regional proliferation (and proliferation reversal) efforts, initiatives to defuse regional tensions that might motivate proliferation, and support for inspection and verification activities. CTR in the nuclear-weapon-possessing New Independent States formerly part of the Soviet Union is particularly significant.

CONCLUSION

"Weapons of mass destruction — nuclear, biological, and chemical — along with their associated delivery systems, pose a major threat to our security and that of our allies and other friendly nations. Thus, a key part of our strategy is to seek to stem the proliferation of such weapons and to develop an effective capability to deal with these threats. We also need to maintain robust strategic nuclear forces and seek to implement existing strategic arms agreements."

A National Security Strategy of Engagement
and Enlargement,

The White House, February 1995, p. 13.

The proliferation of nuclear, chemical, and biological weapons is not a hypothetical threat. A number of states have NBC military capabilities; a larger number are capable of producing such weapons, potentially on short notice.

Prevention of proliferation is the first priority. The Department of Defense provides critical support to national and international prevention efforts. The Defense Department has unique responsibilities for the military responses needed if prevention fails: active defense, passive defense, counterforce, and response to paramilitary/covert threats.

Our current appreciation of the counterproliferation threat dates from the Gulf War, in which there were

a number of unpleasant surprises involving Iraq's NBC programs. Development of a coherent, effective national response has required policy initiatives, adaptation of military planning and operations, acquisition of new capabilities, new Intelligence Community programs, and international cooperation. In a brief period of time, considerable progress has been made. Much, however, remains to be done.

Technical Annex

Accessible Technologies

ACCESSIBLE TECHNOLOGIES

OVERVIEW

This annex addresses the technologies that enable NBC proliferation. It provides an overview, not a detailed technical appraisal. It begins with nuclear, biological, chemical, and weapon technologies and their military significance. Next, the effects of nuclear, biological, and chemical weapons are compared. Attention is then given to the delivery system and other technologies that facilitate development and use of NBC weapons.

NUCLEAR WEAPONS

Weapons and Weapons Technology

The Manhattan Project that developed the nuclear weapons employed in World War II identified the two primary routes to a nuclear capability. The first weapon used in conflict, at Hiroshima, was a gun-assembly weapon that propelled a subcritical mass of uranium-235 (U-235) into a second, also subcritical, mass of U-235 producing the critical mass needed for a nuclear explosion. The second weapon, used at Nagasaki, was an implosion weapon. In such a device, an outer shell of chemical high-explosives surrounds a subcritical sphere of fissionable nuclear material, for example, plutonium-239 (Pu-239). Precise detonation results in an implosion that produces a critical mass and the resulting nuclear explosion.

U-235 and Pu-239 are the optimal weapons grade nuclear materials for a weapon. However, mixed isotope plutonium (reactor grade material) can be used in nuclear weapons; such a device would be less efficient and might have a less predictable yield. A weapon using nonweapons-grade plutonium was successfully detonated in a 1960s test. Another alternative would be a radiological weapon that employed conventional explosives or other means to scatter radioactive material. Such a weapon would not produce a nuclear yield; however, it could spread contamination. While such weapons would have less military significance than devices that result in nuclear detonations, radiological weapons have enormous potential for

intimidation. Targeting a nuclear reactor in an antagonist's territory to produce an accident releasing nuclear material would be another option.

There are hundreds of nuclear reactors and many more nuclear sources throughout the world, such as radiological materials used in hospitals. Both international and national measures control these items and associated materials and thereby contribute to proliferation prevention. However, post-war investigations in occupied Iraq showed that at least some of these control regimes could be circumvented, even by a state that was a nominal adherent to the Nuclear Non-Proliferation Treaty. Near-term concerns include the accumulation of large quantities of plutonium from reactors that is intended for reprocessing and/or storage, and the status of nuclear materials in the New Independent States that previously comprised the Soviet Union.

Military Significance

A nuclear detonation releases vast amounts of energy which is manifested as blast effects (roughly 50 percent of the total energy), heat (35 percent), and nuclear radiation (15 percent). Height-of-burst influences effects. If the fireball does not touch the ground, there may not be militarily significant fallout. At higher altitudes, the Electromagnetic Pulse (EMP) from a nuclear weapon — a powerful radio wave — can damage electronic equipment at considerable distances. If launched on a theater ballistic missile to very high altitudes, even a single nuclear device might damage or destroy the communications and intelligence satellites whose importance was demonstrated during the Gulf War.

There are many uncertainties associated with potential proliferant employment of nuclear weapons. We do not know how successful the proliferant will be in implementing fusing, yield enhancement, delivery system accuracy, and other technologies. For immediate purposes, it is reasonable to use a baseline case of a weapon using 1950s vintage U.S. technology — a simple fission weapon with a tens of kilotons yield that could be delivered by aircraft or tactical missiles. Such weapons would have been devastating if detonated on the small number of ports (two primary facilities) and

airfields that provided critical support during Operation Desert Storm.

CHEMICAL WEAPONS

Weapons and Weapons Technology

Chemical weapons (CW) are compounds used in military operations or as terrorist weapons to kill, incapacitate, or seriously injure personnel through their chemical properties. Most CW agents useful as military weapons are not gases, although poison gas is a term commonly used. While chlorine gas was used in World War I, most agents are liquids, which facilitate munitions loading and contribute to stability in storage and transportation. When employed, these liquids are dispersed as droplets. These droplets can either penetrate the skin or vaporize and become a respiration hazard.

Chemical agents are either persistent or nonpersistent. Persistent agents may last from hours to days. Nonpersistent agents last minutes to hours. Agents can be lethal or nonlethal. The effects induced can include blistering, choking, blocking

the ability of body tissue to absorb oxygen, convulsions, and paralysis. Reports indicate that the 1995 Japanese subway incident involved Sarin, an agent that attacks the nervous system.

The precursor chemicals and intermediate stages in the production process for two classical CW agents, nerve and blister agents, have both agricultural and industrial uses. For example, Thiodiglycol, which has been used to produce ball-point pen ink, can be converted to mustard agent by a simple (single) chlorination step. The technology and most of the production equipment, moreover, even the military hardware necessary for delivery and dissemination, are dual-use. Detection and discrimination between legitimate and illegal production are difficult. Facilities producing pesticides, insecticides, and fire retardant chemicals could be converted to CW production. There are strong external similarities between civilian and military facilities, although the latter may have observable security measures such as restricted access areas and fences, and possibly storage areas used for chemical munitions. Knowledgeable personnel are readily available; a relatively small number of chemical engineers and technicians are needed for production of chemical weapons.

CW THREATS DURING THE GULF WAR

"While the defensive capabilities of U.S. and other Coalition forces improved rapidly, CW/BW defensive readiness at the outset of the crisis was quite low. Coalition forces embarked on extraordinary measures to correct these weaknesses, largely by building up the preparedness of individuals to protect themselves in the event of CW/BW attack. On balance, these gains did lead to a significant potential for U.S. forces to operate on a contaminated battlefield. While the outcome would have been unaffected, the tempo of the Operation Desert Storm campaign could have been hindered had U.S. troops been forced to remain fully protected by masks and suits. Temperatures during Operation Desert Storm were comparatively cool; data indicate that risks of heat exhaustion would have been sharply higher in the summer, making protracted use of personal protective gear impractical. Studies have also shown that protective equipment dramatically impedes crew performance. The masks hinder communications, and the suits impair the ability to operate equipment. High-speed combat requiring close coordination between crews manning complex systems becomes quite difficult.

THE IRAQI THREAT. Iraq had developed a substantial CW capability including research and development facilities; stockpiles of CW munitions; a variety of delivery systems; and the doctrine and training to employ integrated CW and conventional fire effectively on the battlefield. Iraq was the first nation to use nerve agents on the battlefield — attacking unprepared Iranian troops in 1984. By 1990, Iraq had the largest CW agent production capability in the Third World, annually producing thousands of tons of blister and nerve agents..."

Source: Conduct of the Persian Gulf War, p. 640.

CW-suitable dual-use delivery systems are readily available ranging from SCUD missiles and unmanned aerial vehicles to sophisticated cruise and ballistic missiles. If need be, crop duster aircraft and simple spray generators can be readily adapted for delivery of a variety of agents. The quantities of chemical agent required are relatively small when compared to industrial production of similar commercial chemicals, which poses significant problems for detection. The low technology required lends itself to proliferant and even potential terrorist use. Terrorists could employ CW agents in a variety of means utilizing simple containers such as glass bottles, commercial compressed gas bottles, or propane tanks.

Military Significance

Chemical weapons are the only NBC munitions that have been used in post-World War II large-scale conflicts, most recently during the Iran-Iraq war. Consequently, there is cause for concern that proliferators may perceive that international responses (ranging from sanctions to military action) are less likely, given the use of CW.

CW impacts military operations in a number of ways. Large numbers of people (combatants and civilians) can be killed if suitable protective equipment or shelters are not available and properly utilized. There may be large numbers of nonfatal casualties. This was the characteristic experience when CW was employed during World War I. The volume of injured personnel can overwhelm the military medical evacuation and treatment system, impacting operations.

If CW employment is anticipated, forces are required to operate in protective ensembles that degrade operational performance, especially under adverse climatic conditions. Even though forces using appropriate protective equipment may be immune to CW effects, their ability to accomplish tasks is greatly reduced. Furthermore, equipment, facilities, and territory are contaminated. This impacts the ability of forces to maneuver. It also can have a major effect on ports, airfields, and other essential facilities that support operations.

Once CW use occurs, decontamination operations are required. These operations can be time-

consuming. They may require forces to be diverted from other missions. In some instances, current technology decontamination equipment damages equipment. Perhaps most significantly, psychological effects impacting the ability of personnel to perform their missions can occur.

CW employment involves a number of factors, including agent type; the dissemination method (and its dispersion efficiency); droplet size; and meteorological conditions, including temperature, wind speed and direction, and inversion conditions. Agent dispersion can be very dependent on environmental factors, such as wind direction and speed.

Chemical agents can be used as limited area effects (battlefield) or large area effects weapons, to include areas with civilian populations. Unlike nuclear or biological weapons (BW), effective chemical agent attacks sometimes require significant numbers of munitions to achieve large area coverage. This can be an advantage in some situations since it means that the consequences of CW use are more predictable and hence more readily integrated into war plans.

BIOLOGICAL WEAPONS

Weapons and Weapons Technology

Biological weapons employ living agents or toxins produced by such agents or synthetically to kill or injure humans, domestic animals, and crops. Biological weapons are not as well understood as their chemical and nuclear counterparts. It has been more than two decades since the United States terminated its offensive BW programs. U.S. forces have never been attacked with BW.

BW agents can be disseminated in a number of ways — insects, the contamination of water and food supplies, and by aerosol. The dissemination of infectious agents through aerosols, either as droplets from liquid suspensions or by small particles from dry powders, is by far the most efficient method. Delivery means for such munitions include artillery, missiles, and aerial sprayers. These aerosol weapons cause death or injuries when they are inhaled. Arthropod vectors and the contamination of food and water supplies could also be significant modes of dissemination for BW agents.

Genetic engineering and other new technologies now can be employed to overcome product deficiencies in the classic agents and toxins normally addressed in such discussions. Moreover, toxins that exist in nature in small amounts were once considered not to be potential threat agents because of their limited availability. Today, however, a number of natural toxins conceivably could be produced through genetic engineering techniques in sufficient quantities for an adversary to consider producing them as an offensive weapon. There are many microorganisms, or their metabolic byproducts (toxins), that meet all of the criteria for effective BW agents.

Biological weapons and chemical weapons are sometimes treated together as a single category of threat. A key difference is that BW agents characteristically have lethal effects over much larger areas.

There are two basic types of biological munitions: point source bomblets and line source tanks. Within each category there can be multiple shapes and configurations. BW munitions and delivery systems are very interdependent; frequently the munition dictates the delivery system. With the evolution of sophisticated line source hardware, the agent, the munition, and delivery system must be carefully integrated. The effectiveness of BW munitions is very dependent on meteorological conditions.

Different factors are relevant for potential terrorist use of BW and for deliberate attacks against civilian populations in urban areas. The quantity of agent could be small (a single gram, possibly less), production and purification methods extremely simple, and the dissemination means simple-to-complex. All elements of such a program might go undetected until use has occurred. Individual buildings are potential targets. Off-the-shelf aerosol generators could be used to disperse a BW agent into the air inlet ducts of the target structure. Especially in the case of toxins, much less toxic agents could be employed and/or quantities of agent required would be much less than for other targets.

Terrorist consideration of BW agents is not unknown; in 1989, a cell of the German Baader-Meinhof gang was discovered with a culture of *Clostridium botulinum*. Contamination of food and water supplies or aerosol dissemination are

possible. Because only relatively small quantities of relatively impure agent would be required for terrorist use, agent selection is almost unlimited.

In the United States and other Western countries, public and private concern for the safety of the work force and the surrounding community in the years following World War II resulted in the development of elaborate containment facilities for conducting infectious disease research. Fort Detrick Biological Warfare Research and Development Laboratories were pioneers in development of these safety concepts and procedures. Other countries do not necessarily share these safety concerns.

The same point holds for the size of the facilities used to develop biological weapons. A state might elect to build large-scale facilities unique to this function, as was done in the United States prior to 1969. Such facilities would be, in principle, more susceptible to detection. However, there is no requirement to do this. The lower cost (by a considerable margin) and less readily observable approach would be to employ an in-place civilian facility as the site for agent production.

Production equipment will vary, depending on the quantity of material desired, the methods selected for production, and the agent selected. Unlike CW agents, where production is measured in the tons, BW agent production is measured in the kilograms to tens of kilograms. Assessments of BW verification sometimes assume that the problem is to detect production of as little as 10 kilograms of BW agent.

There is nothing unique about the types of equipment (or technology) that might be employed in a BW program. For example, biological safety cabinets have been adopted universally for biomedical research as well as commercial production of infectious disease products, reagents, and so forth. Fermenters, centrifuges, purification, and other laboratory equipment are used not only by the biomedical community, but have other academic and commercial applications as well, such as wineries, milk plants, pharmaceutical houses, and agricultural products. Production of beer, antibodies, enzymes, and other therapeutic products, such as insulin and growth hormone, involves the use of fermenters ranging in size from 10,000 to 1 million liters; such fermenters could produce significant quantities of BW agent. Key technologies have an intrinsic dual-use character.

Military Significance

Biological weapons can inflict casualties over a very large area. Much of their military effectiveness is due to this area coverage. A number of additional factors impact on the effectiveness of a BW attack. It may not be immediately evident that an attack has taken place. The attack may employ novel agents that are not well-characterized and for which there may not be vaccines or treatments. Decontamination may be difficult if deployed sensors cannot detect the agents utilized.

Even if immediate effects on military personnel are mitigated, perhaps through the use of protective masks, the impact on affected civilian populations may have a major effect as civilians evacuate and military forces render assistance to afflicted personnel. Furthermore, personnel effectiveness is reduced when the protective mask is worn, and psychological impact may be significant.

Biological weapons are a horrifying reality. A number of states have BW programs. Experience in the Gulf War showed the hazards our forces might face during contingency operations:

"By the time of the invasion of Kuwait, Iraq had developed biological weapons. Its advanced and aggressive biological warfare program was the most extensive in the Arab world. Although Baghdad stated in 1991 it was in compliance with the 1972 Biological and Toxin Weapons Convention, the program probably began in the late 1970s and concentrated on the development of two agents — botulinum toxin and anthrax bacteria. (United Nations inspection teams were later to find evidence of these two toxins, as well as clostridium perfringens.) Large scale production of these agents began in 1989 at four facilities near Baghdad. Delivery means for biological agents ranged from simple aerial bombs and artillery rockets to surface-to-surface missiles."

Source: Conduct of the Persian Gulf War, p. 15.

COMPARISON OF NUCLEAR, BIOLOGICAL, AND CHEMICAL WEAPON EFFECTS

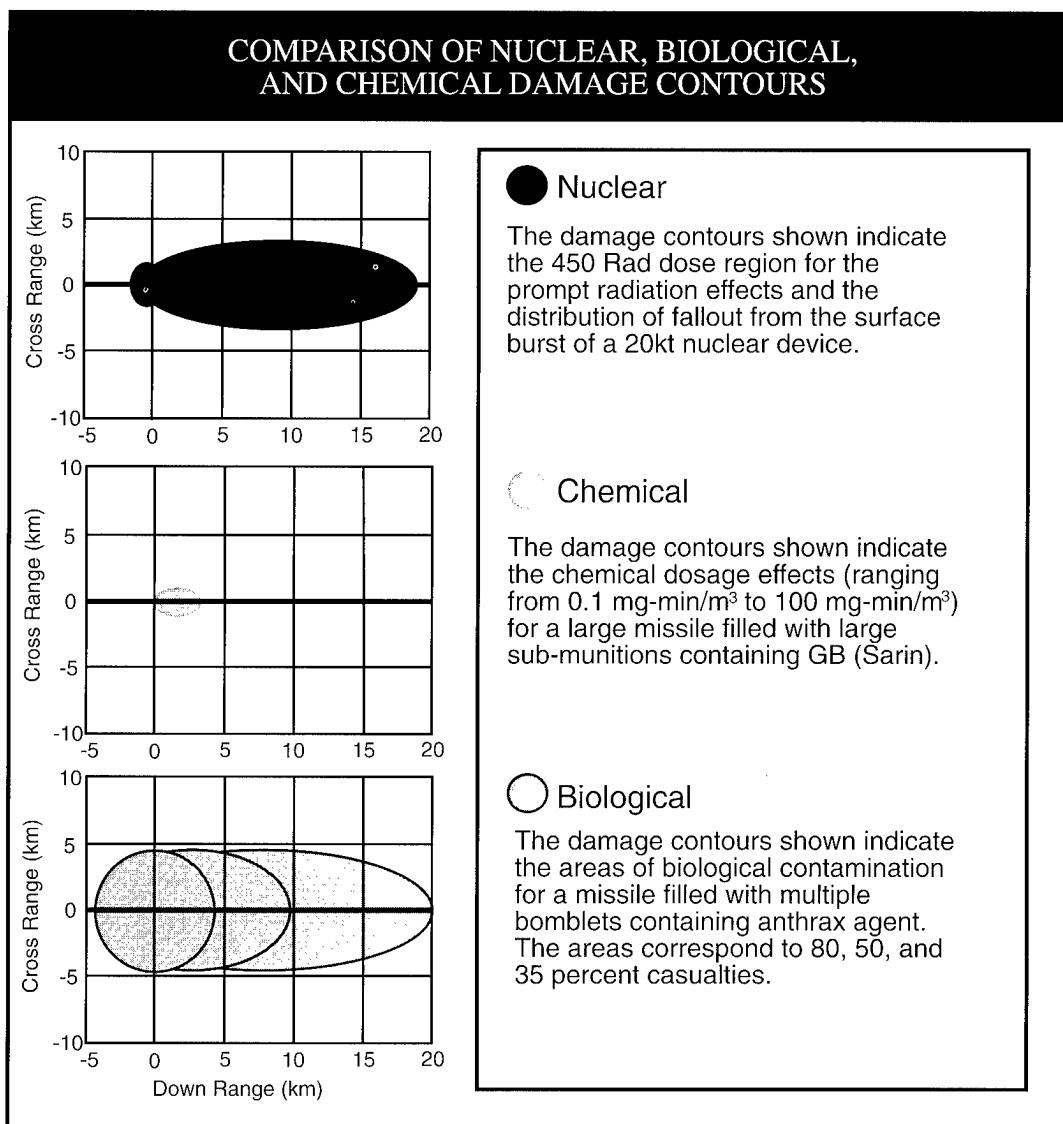
All three types of NBC weapons have effects that can cause damage or contamination over large areas. Each of these areas would be sufficient to cover the typical port or airfield that might support U.S. forces during a major regional conflict. The example presented below is biased against chemical and biological munitions. A line source carried by an aircraft might provide 10 times as much coverage for a biological munition, particularly if weather conditions were favorable.

Some differences between the effects of NBC weapons merit attention. While all three types of weapon can kill or injure personnel and spread contamination over broad areas, only nuclear weapons can destroy equipment and facilities. Some military effects are weather-dependent — dispersal of chemical and biological agents and the distribution of fallout or radiological contamination.

Military efficacy can vary over time. Once chemical or biological weapons are first used, information becomes available concerning the agents used, which allows agent-specific antidotes to be identified and protective postures adopted. While some protective measures can be implemented subsequent to initial use of nuclear weapons, such as dispersal of forces, the efficacy of nuclear weapons does not have the same variation over time.

Particularly in situations in which a small number of NBC weapons are delivered through unconventional means, attacks may be anonymous. In the case of biological warfare, the existence of an attack may be open to question — the cause of the disease may not be obvious.

Any state that has biomedical or chemical research and production facilities or that has radiotherapeutic centers in hospitals has the basic technologies needed to develop biological, chemical, or radiological weapons. Nuclear weapons are



more difficult to produce. More weapon- and program-unique technologies are needed. However, the cases of Iraq and South Africa suggest that programs designed to produce a small number of weapons are feasible and may be difficult to detect.

The incremental costs of proliferation vary. Little additional investment may be needed to transform a civilian chemical or biomedical capability into a weapons program, particularly one for low-rate production. More weapon-program-specific costs are likely to be associated with nuclear proliferation. The same cost relationships hold on a per-weapon basis. Nuclear weapons are significantly

more expensive to produce than chemical and biological munitions.

DELIVERY SYSTEMS

Introduction

A number of delivery system options are available for terrorist or paramilitary delivery of NBC weapons. States that want to employ NBC weapons to support military operations are likely to make use of combat aircraft, ballistic missiles, or cruise missiles.

Combat Aircraft

Combat aircraft are already available in every country that has or is suspected of acquiring NBC weapons — and are being modernized in most. Such aircraft can carry more payload than either ballistic or cruise missiles. Piloted aircraft offer flexibility in delivering NBC weapons and perhaps superior capabilities in dispersing chemical or biological agents. They can be used effectively in most circumstances, if they can be affordably employed in sufficient numbers to overcome modern air defenses. If involved in a conflict with the United States, they must also overcome U.S. offensive air capabilities. However, even small numbers of aircraft armed with NBC weapons can cause significant damage.

Major investments are required to acquire and sustain a combat aircraft capability and the associated infrastructure, training, operations, support, and technology improvements needed to maintain a viable ability to penetrate modern air defenses — which are increasingly effective and widely available. Transfer of stealth technology could strengthen the effectiveness of combat aircraft in delivering NBC weapons — but not simply or cheaply. Such high technology combat aircraft would be very expensive to acquire, operate, and maintain — and would become particularly high value military targets, inherently dependent on fixed, usually well known, airfields — vulnerable to attack in any sustained regional conflict. (Harriers and other vertical take-off and landing aircraft are exceptions to this generalization.)

For most nations developing NBC weapons, advanced fighters and strike aircraft offer the capability to strike at greater range than their current ballistic or cruise missiles. The market for advanced aircraft is highly competitive, involving economic, political, and military considerations that preclude any significant reduction in the availability and modernization of such aircraft that would permit NBC weapons delivery to ranges between 500 and 1500 km. Military aircraft capable of delivering NBC weapons to greater ranges are generally limited to the industrial powers; this is likely to remain the case for the foreseeable future. Note, however, that the effective range of an NBC

delivery system aircraft can be extended if the weapon is carried as an air-launched cruise missile.

Ballistic Missiles

Ballistic missiles offer potential proliferators several advantages over manned aircraft — as evidenced by the fact that over two-thirds of the NBC weapons states of concern also have programs to acquire them. They are less expensive to acquire and sustain than a modern air force. Their mobility makes them far less vulnerable to U.S. offensive operations than manned aircraft with their ties to fixed air bases. Perhaps of most importance, until the Gulf War, the absence of any defense against ballistic missiles offered them a free ride to their targets. Furthermore, we can anticipate that states with more launch capability than demonstrated by Iraq during the Gulf War will launch large scale salvo attacks against high priority targets, with smaller numbers of missiles being directed against targets of opportunity. Salvo attacks maximize damage and compensate for the inaccuracy of older technology missiles.

The potential for coercion is perhaps the long-range ballistic missile's greatest value to a proliferator and the greatest challenge for those seeking to restrain that state. Beyond their coercive value in threatening distant cities and ability to drain military resources seeking to counter that coercive threat, missiles — if sufficiently accurate and/or lethal — can also pose major direct military threats.

From the perspective of the leader of a state, ballistic missiles are an effective instrument — even the weapon of choice — to threaten the rear of U.S. and coalition forces in the face of U.S. air superiority. Missiles are much less expensive than acquiring and maintaining a world-class air force competitive with U.S. military aviation; missiles with a low profile infrastructure and mobile launchers are much less vulnerable than aircraft to U.S. offensive operations; missiles are easier to control than other means of deep strike; and even when armed with high explosives, missiles can have considerable psychological effects when used against urban targets.

Attempts may be made to accelerate development by purchasing ballistic missile technology and technological know-how from other countries.

While technological aspects of developing ballistic missiles are challenging, they are well and widely known. Thus, attempts to block a determined adversary are likely only to slow development. As more nations begin deploying ballistic missile defenses, their adversaries will likely begin developing countermeasures to these defenses, which need not be expensive or involve high technology, to create difficulties for the defense, especially for missiles targeted to terrorize civilians.

Cruise Missiles

Article two of the Intermediate-Range Nuclear Forces (INF) Treaty provides a useful definition: "A cruise missile is an unmanned, self-propelled vehicle that sustains flight through the use of aerodynamic lift over most of its flight." Cruise missiles may be even less expensive and more accurate than ballistic missiles, and their smaller size may make them an even more elusive target for counterforce operations. Furthermore, they may also be more difficult to defend against than manned aircraft because of their lower radar cross-sections. Even though short-range anti-ship cruise missiles are already widely available, there are only a few countries that possess long-range land-attack cruise missiles. However, there are no technological barriers preventing developing nations from developing or purchasing these relatively inexpensive, potentially very accurate delivery systems.

Even unsophisticated unpiloted aerodynamic vehicles — or cruise missiles — could be configured to accomplish a variety of missions. Such aerodynamic vehicles are widely available, inexpensive (to purchase, support, and operate), small, mobile, easy to hide, capable of being launched from a variety of launch platforms (air, ground, ship, or submarine) without significant modifications to the missile, potentially hard to detect in-flight, and (with global positioning systems (GPS)) accurate to a few tens of meters. Depending on the details of the design, they could be difficult to detect, track, and defeat with current active defenses.

Although they can be designed to deliver their payloads to great distances (both the United States and the former Soviet Union built cruise missiles with range capabilities of more than 3,000 km), the majority of aerodynamic vehicles can only achieve

short ranges of less than 250 km. It should be noted that the effective range of an aircraft-carried cruise missile is a function of both the aircraft's range (when carrying this load) and the missile.

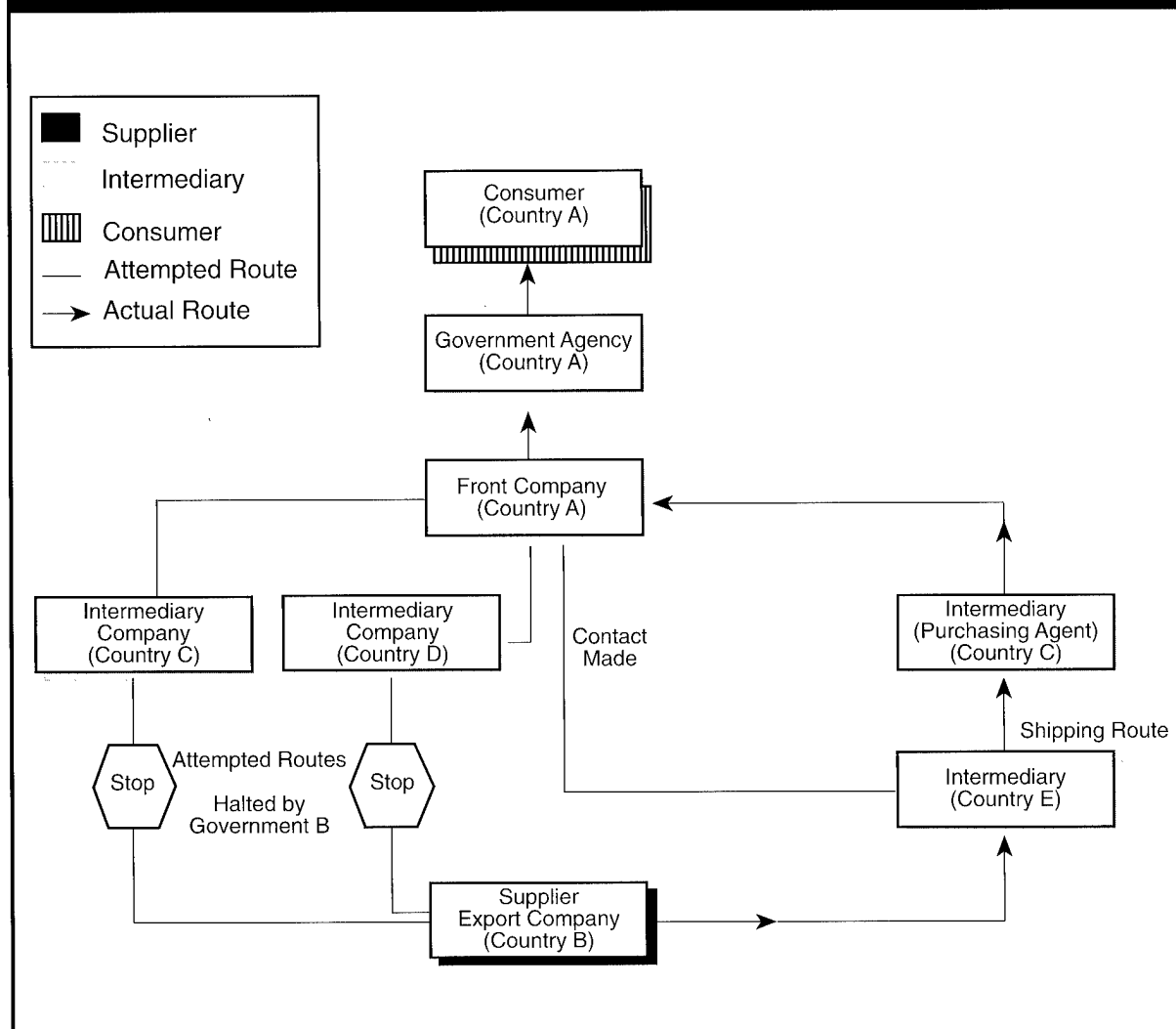
There is little proliferation, as yet, of long-range land-attack cruise missiles. But because of the Tomahawk's apparent success in the Gulf War, indigenous development programs for long-range cruise missiles can be anticipated among proliferant nations. These nations may also purchase technology, hardware, and complete systems from other countries.

ACQUISITION AND PROTECTION OF STRATEGIES

Countries intent on obtaining NBC weapons or missile capabilities must either buy the necessary hardware or establish their own capability. In the case of military attack, they also must devise ways to protect their capabilities from destruction. These countries use a variety of covert and overt strategies to attain their goals, all of which make it difficult for us to determine the status of their programs.

- Some countries establish purchasing networks to conceal the supplier or recipient of foreign assistance. Typical networks feature the use of front companies and intermediaries in several countries to mask the transfer of the technology or equipment. Other key linkages of a covert network include banks, false end user certificates, numerous transshipment points, and several methods of shipment.
- Some countries exploit dual-use technologies to conceal the actual intended application of imported items. Much of the technology, components, or production facilities needed for the production of NBC weapons or missiles may have peaceful purposes. Such dual-use items are difficult to track, particularly as a proliferator is likely to claim a benign or legitimate use for them. For example:
 - The key ingredients of nuclear weapons, highly enriched uranium (HEU) and plutonium, have potential civil uses as reactor fuel to produce electricity or for research.

GENERAL PURCHASING NETWORK



In this example, the export company in Country B attempted to deliver illegal material to Country A. After several unsuccessful attempts, the company found an alternate route that circumvented export controls and it delivered the material to the customer in Country A.

- Many precursor chemicals have dual uses: Thiodiglycol, previously used for ball-point ink, can be converted to mustard agent by a simple (single) chlorination step.
- Fermenters used in the production of beer, antibiotics, enzymes, and other therapeutic products, such as insulin and growth hor-

mone, can also be used to produce significant quantities of biological warfare agent.

- The hardware, technology, and production facilities of SLVs are essentially interchangeable with those of ballistic missiles.
- UAVs for the delivery of insecticide are adaptable as cruise missiles for the delivery of chemical or biological agents.

- With the removal of specialized equipment for tracking an airplane, surface-to-air missiles (SAMs) can be adapted as single-purpose ballistic missiles as shown on the chart:

**PROLIFERATION OF BALLISTIC
MISSILES DERIVED FROM
RUSSIAN SA-2
SURFACE-TO-AIR MISSILE**

China	<ul style="list-style-type: none">– Produced its own SA-2 — the CSA-1– Modified CSA-1 into SRBM — the CSS-8 (range — 150 km)– Sold CSS-8 to Iran
Iraq	<ul style="list-style-type: none">– Attempted to convert SA-2 into 300 km range SRBM (Al Fahd 300)– Attempted to use SA-2 as second stage sustainer for 2,000 km range IRBM (Tammouz I)
India	<ul style="list-style-type: none">– Developed two versions of Prithvi SRBM — ranges 150 km and 250 km– Used Prithvi as second stage for Agni IRBM — intended range 2,000 km

- Some countries conceal NBC facilities to protect them from attack by constructing underground and other hardened facilities. Placing an NBC capability — a weapon, a delivery system, or a production complex — within a hardened facility enhances a country's ability to conceal the facility's location, while providing additional protection against attack. Outer perimeter protection in such facilities may involve concrete and steel roofs with earth cover. Other options include use of tunnels, including existing coal and salt mine complexes and natural caves that can be both deep and extensive. Within a hardened complex such measures as blast doors, barriers, turns in tunnels, and expansion chambers can channel and deflect blast waves, mitigating weapon effects.

The Iraqi facilities attacked during the Gulf War were for the most part from an early generation of protective facilities construction. Because of the success achieved by U.S. weapons against these type facilities, a new trend has been observed: the use of deep underground facilities such as abandoned mines or tunnels into hills and mountains. Modern excavating equipment has speeded the process of constructing such facilities and has reduced construction costs.

- Countries routinely use denial and deception to in order conceal research, development, production, and storage programs and facilities; to prevent detection of illicit technology acquisition efforts; to degrade international efforts to detect and confirm undeclared programs; to hide noncompliance with arms control agreements; and to ensure wartime survival of sensitive programs and facilities.

States use methods such as official secrecy, clandestine acquisition programs, signals security, emissions control, disguised or fake installations and equipment, underground facilities, environmental shielding, and technical camouflage to hide their programs. Finally, states use deceptive measures such as false official cover stories and disinformation.

SUPPORTING TECHNOLOGIES

Introduction

A number of technologies and technology applications support the development and use of NBC weapons and associated delivery systems. Among the most critical are those that improve proliferants' ability to locate targets, accurately deliver munitions, and thwart non- and counterproliferation.

Target Acquisition

In order to make effective use of NBC weapons, proliferants must have accurate information concerning the location and status of targets — what is the precise distance and direction between the launch points of the NBC delivery systems and the intended target? — what ports and airfields are supporting operations?

Until very recently, it was difficult for most states to obtain this information for distant targets. While some mechanisms were available, for example, overflight by reconnaissance aircraft, these entailed risk and might not provide all of the needed information. Maps might be consulted; however, many are inaccurate or do not contain all of the military targets of interest.

The availability of satellite imagery has had a major impact on the ability of proliferants to obtain the data needed for effective targeting. The key systems here have been SPOT and LANDSAT — French and American satellites, respectively, that provide imagery. In peacetime, data from these satellites is commercially available. More recently, data from Russian imagery satellites has also become available on the open market.

SPOT and LANDSAT can provide reasonably high resolution images in the range of 10-30 meters. Resolution refers to the size of an object on the ground that can be seen in the sense that it can be distinguished from other objects. Location accuracy depends on the availability of reference information — visible known locations that can be identified. For SPOT, accuracies on the order of 15 meters or better are possible when imagery covers areas with known and precisely located reference points. Depending on the number of SPOT or LANDSAT satellites that are in orbit, considerable time can transpire between successive images of the same location.

During the Gulf War, Iraq did not have access to imagery from SPOT and LANDSAT. Coalition forces, on the other hand, made use of both satellites. While neither satellite has the very high resolution needed to distinguish individual vehicle-size objects, both provided useful wide-area views of the theater to Coalition forces.

During peacetime, proliferants might make use of imagery from SPOT and LANDSAT to develop accurate maps of targets in other states. Civilian use of these systems has shown that some maps, particularly for areas in the developing world, can have significant errors (cities mislocated by miles). Useful information might also be developed concerning military capabilities, such as the locations of airfields that might be used by military forces during a conflict.

In the future, higher resolution data is likely to be commercially available to include 1-meter-scale data from U.S. firms and 5-meter-resolution imagery from the next generation of SPOT satellites. Currently, advertised resolutions (which are best possible values) might not be achieved if the target of interest is not aligned with the satellite's track. The payoff from this access to satellite imagery would be the ability to identify the ports, airfields, and other facilities that are in use and to obtain information concerning the dispositions and locations of military forces not otherwise subject to observation. Iraq, for example, might have used such a capability to discover that Coalition forces had shifted their positions prior to ground operations in Operation Desert Storm. Access to timely imagery of at least moderate resolution would be a significant improvement in military capabilities.

Accurate Guidance and Navigation

The availability of low cost systems that provide high accuracy navigation and guidance is a recent development. NAVSTAR GPS and GLONASS (its Russian counterpart) use constellations of satellites to send signals that can be utilized to provide high accuracy navigation. GPS receivers are available in stores and catalogs at prices of \$200-\$500.

GPS broadcasts protected military and in-the-clear civil signals with accuracies of less than 10 meters and 30-50 meters, respectively. If the Selective Availability security feature is removed from GPS, it will provide in-the-clear accuracy of approximately 3-5 meters.

The accuracy of navigation can be improved considerably by performing sophisticated processing on the GPS signal or by combining information from GPS with location data provided by other sources such fixed reference stations (differential GPS) or inertial measurement systems.

GPS is based on signals that are broadcast by satellites. As is the case with any signal, attempts might be made to jam a GPS-equipped delivery system. This might be done with systems that have limited range located near probable targets (NBC facilities). The effectiveness of such jamming interference would depend on a number of factors; for example, is GPS the only guidance system employed or is it complemented by other navigation aids?

“Coalition targeting policy and air crews made every effort to minimize civilian casualties and collateral damage. Because of these restrictive policies, only PGMs (Precision Guided Munitions) were used to destroy key targets in downtown Baghdad in order to avoid damaging adjacent civilian buildings. Planners were aware that each bomb carried a potential moral and political impact, and that Iraq has a rich cultural and religious heritage dating back several thousand years. Targeting policies, therefore, scrupulously avoided damage to mosques, religious shrines, and archaeological sites, as well as to civilian facilities and the civilian population.

During December, a team was formed in the continental United States (CONUS) to determine the most effective way to attack Iraq’s arsenal of CW/BW weapons. Several experiments were conducted which attempted to find a way to destroy these weapons without releasing BW agents or causing significant collateral damage. Finally, through the timing of attacks and choice of munitions, planners were able to minimize the chance for toxins to spread. No chemical or biological agents were detected after the attacks and no CW/BW collateral damage was experienced.”

Source: Conduct of the Persian Gulf War, Final Report to Congress, April 1992, pp. 99-100 and 154-155.

Measures to Challenge Non- and Counterproliferation

A primary concern here involves the deliberate collocation of NBC facilities near civilian populations and facilities that the United States and its allies and coalition partners might be reluctant to attack due to civilian casualty considerations (see above). Responses include development and utilization of improved precision-delivery munitions and improved capabilities for the prediction and mitigation of collateral effects.

CONCLUSION

Acquisition of NBC weapons, missiles and other delivery systems, and supporting technologies is considerably easier than was the case in the 1940s and 1950s, when most of the declared nuclear powers developed their nuclear arsenals. There has been a diffusion of the technologies that enable proliferation, a number of which have legitimate civilian applications and are inherently dual-use.

Military counterproliferation planning must have two focuses. The first involves current threats, as reviewed in Section I. These risks involve known instances of NBC proliferation. While there is no question but that the world is a safer place than it was at the height of the Cold War in terms of the risk of a major strategic conflict, significant threats to U.S. national security persist.

The second focus involves potential threats. No one writing this document 10 years ago would have had the foresight to predict the end of the Cold War or the Gulf War. In an uncertain world, all potential antagonisms cannot be forecast. Hence, some planning and investments cannot be adversary-specific and must instead address the types of threats that are enabled by the availability of relevant, state-of-the-art technologies.

The character of warfare has changed. Just as military planners must assume that antagonists may have armored forces and combat aircraft, planning for major regional conflicts must give consideration to the possibility that adversaries may have NBC weapons and the means to deliver them.

Glossary

GLOSSARY

ABL	Airborne Laser	DOE	Department of Energy
ACRS	Arms Control and Regional Security (Middle East)	DTSA	Defense Technology Security Administration
ACTD	Advanced Concept Technology Demonstration	EMP	Electromagnetic Pulse
ALCM	Air Launched Cruise Missile	EOD	Explosive Ordinance Disposal
BDA	Battle Damage Assessment	FLIR	Forward Looking Infrared Radar
BMDO	Ballistic Missile Defense Organization	FSU	Former Soviet Union
BW	Biological Weapons	GPS	Global Positioning System
BWC	Biological Weapons Convention	HEU	Highly Enriched Uranium
C ³	Command, Control, and Communications	IAEA	International Atomic Energy Agency
CBD	Chemical/Biological Defense	IC	Intelligence Community
CFE	Conventional Forces in Europe	ICBM	Intercontinental Ballistic Missile (Range: Greater than 5,500 km)
CINC	Commander in Chief	INF	Intermediate-Range Nuclear Forces
CJCS	Chairman of the Joint Chiefs of Staff	IRBM	Intermediate Range Ballistic Missile (Range: 3,000 to 5,500 km)
COCOM	Coordinating Committee for Multilateral Export Controls	JCP	NATO Joint Committee on Proliferation
CONUS	Continental United States	JCS	Joint Chiefs of Staff
CPRC	Counterproliferation Program Review Committee	JMIP	Joint Military Intelligence Program
CTBT	Comprehensive Test Ban Treaty	JPO-BD	Joint Program Office for Biological Defense
CTR	Cooperative Threat Reduction	JWCA	Joint Warfighting Capabilities Assessment
CW	Chemical Weapons	km	Kilometers
CWC	Chemical Weapons Convention	LANDSAT	Land Remote Sensing Satellite
DARPA	Defense Advanced Research Projects Agency	LEU	Low Enriched Uranium
DCI	Director of Central Intelligence	MAD	Mutually Assured Destruction
DGP	NATO Senior Defence Group on Proliferation	MEADS	Medium Extended Air Defense System
DIA	Defense Intelligence Agency	MRBM	Medium Range Ballistic Missile (Range: 1,000 to 3,000 km)
DMZ	Demilitarized Zone	MTCR	Missile Technology Control Regime
DNA	Defense Nuclear Agency	NAVSTAR	Navigation Satellite Timing and Ranging
DoD	Department of Defense	NBC	Nuclear, Biological, or Chemical
		NEST	Nuclear Emergency Search Team

GLOSSARY

NFIP	National Foreign Intelligence Program	SGP	NATO Senior Politico-Military Group
NIP	Nuclear Incident Program	SLBM	Submarine Launched Ballistic Missile
NIS	New Independent States	SLV	Space Launch Vehicle
NPC	Non-Proliferation Center	SOF	Special Operations Forces
NPRC	Nonproliferation Program Review Committee	SRBM	Short Range Ballistic Missile (Range: 1,000 km or less)
NPT	Nuclear Non-Proliferation Treaty	SSM	Surface-to-Surface Missile
NSG	Nuclear Suppliers' Group	START	Strategic Arms Reduction Talks
OPCW	Organization for the Prohibition of Chemical Weapons	TBM	Theater Ballistic Missile
OSCE	Organization on Security and Cooperation in Europe	TBMD	Theater Ballistic Missile Defense
OSD	Office of the Secretary of Defense	THAAD	Theater High Altitude Area Defense
OSIA	On-Site Inspection Agency	TIARA	Tactical Intelligence and Related Activities
PAC	Patriot Advanced Capability	TMD	Theater Missile Defense
PGM	Precision Guided Munition	UAV	Unmanned Aerial Vehicle
PrepCom	Preparatory Commission	UGS	Unattended Ground Sensors
Pu	Plutonium	UN	United Nations
R&D	Research and Development	U.S.	United States
RDT&E	Research, Development, Test, and Evaluation	UNSCOM	UN Special Commission on Iraq
SAM	Surface-to-Air Missile	UNSCR	UN Security Council Resolution
SEI	Specific Emitter Identification	USG	United States Government
		USSOCOM	U.S. Special Operations Command